

FOUNDED, 1904

The Far Eastern Review

ENGINEERING + FINANCE + COMMERCE

THE PIONEER IN ITS FIELD

A Monthly Review of Far Eastern Trade, Finance and Engineering, Dedicated to the Industrial Development and Advancement of Trade in Far Eastern Countries.

HEAD OFFICE: 5 JINKEE ROAD - - - SHANGHAI, CHINA.

George Bronson Rea, *Editor and Publisher*

William Carter Rea, *Advertising Manager*

JAPAN OFFICE: H. C. Huggins, Representative,
No. 12 Takagi-cho, Akasaka-ku, Tokyo.

NEW YORK: British and Colonial Press, Inc.,
738 The Knickerbocker Building, Broadway and 42nd Street.

MANILA OFFICE: Fleming, Percy Smith and Seth,
Roxas Building, Escolta.

BERLIN: Rudolf Mosse,
46-49 Jerusalemer Strasse.

GREAT BRITAIN: Walter Judd, Ltd., 81-87 Gresham Street Bank,
London, E.C.

SAN FRANCISCO: Leroy P. Boyce, Monadnock Building

SUBSCRIPTION IN CHINA: \$10.00 Mexican, U. S. & Philippines Gold \$5.00, Elsewhere \$12.00 Mexican per annum

VOL. XVIII

SEPTEMBER, 1922

NO. 9

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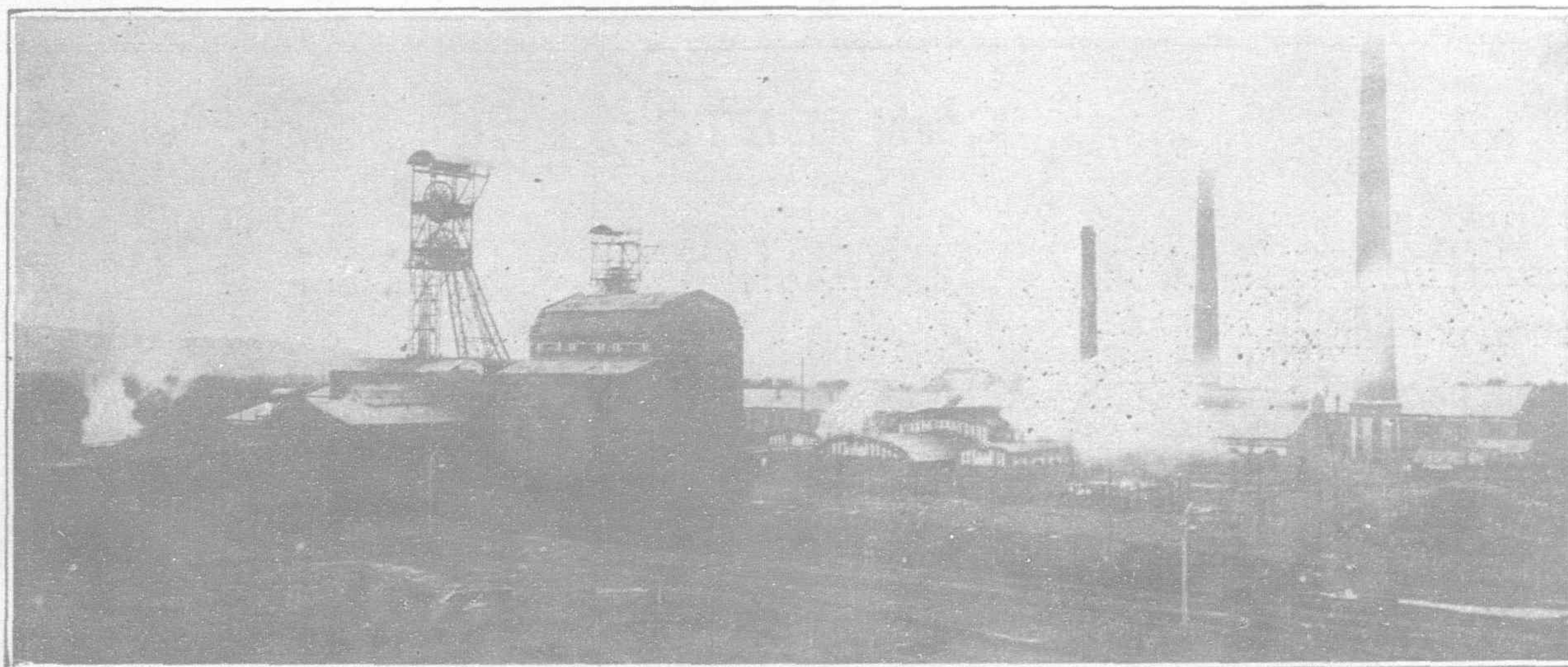
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Entered at the U.S. Postal Agency, Shanghai, China, as second-class matter. Registered at the Chinese Post Office as a Newspaper. Entered at the Japanese Post Office as a Newspaper.

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THE FAR EASTERN REVIEW



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ENGINEERING PROGRESS
IN KOREA
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ELECTRICAL DEVELOPMENTS
IN JAPAN
TIN MINING IN CHINA
CONSERVANCY WORK IN CHINA
BUILDING PORTS IN MALAYA
FAR EASTERN MOTORS

遠東時報

Vol. XVIII

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FIRST in the Field—

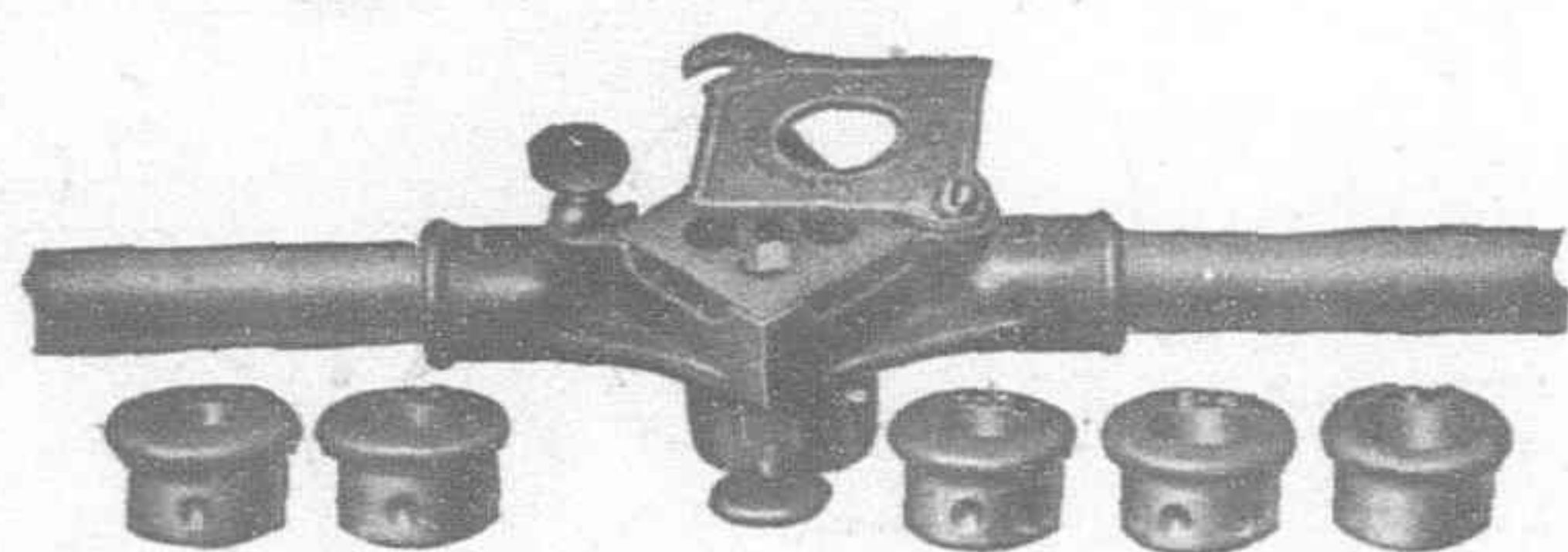


FIG. W4161. Nos. 0 to 1 1/4, without Leader Screw

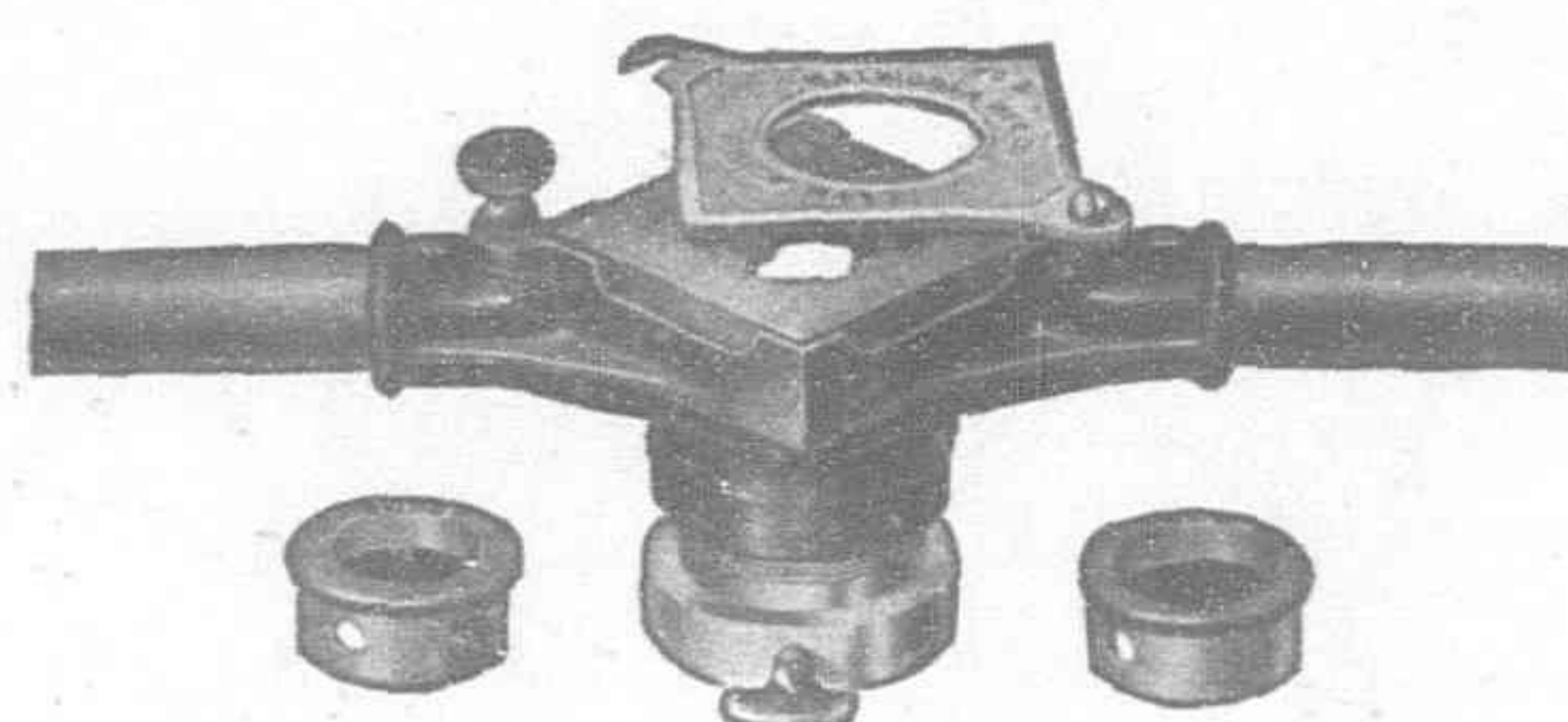


FIG. W4162. Nos. 2, 3, 4, with Leader Screw

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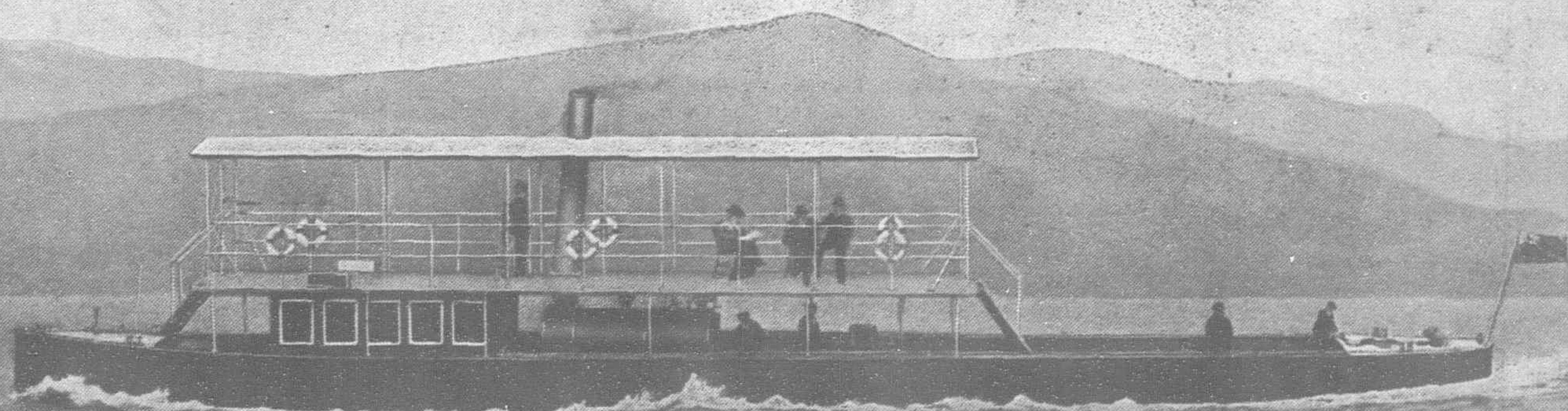
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Engineering Progress in Korea

The Advance of Industry and Public Works in the "Land of the Morning Calm"

Harbor Improvements

DURING the protectorate régime a sum of over Y.4,000,000 was allotted in the budget for building customs piers in eleven harbors, viz., Fuzan, Jinsen, Chinampo, Heijo, Genzan, Shingishu, Gunzan, Moppo, Seishin, Joshin and Bazan, and while work was still going on in such important harbors as Jinsen, Fuzan and Chinampo, the treaty of annexation was signed, in consequence of which the government-general took over all these works, enlarged their scope, and has all but completed them, except in Genzan where the work was not begun until the fiscal year 1915.

(a) FUZAN

The scheme for Fuzan was to construct two iron piers, adjust the landing-place, and dredge the harbor. Pier No. 1 was finished in March, 1912. It is 152 ken long and 12.7 ken wide, and can accommodate at the same time two steamers of 3,000 to 4,000 tons on its southern side, while on the north it is connected with an extension of the railway station, thus giving direct connection between steamer and train. Pier No. 2 was constructed parallel with Pier No. 1 to the north and has a length of 200 ken and a width of 21 ken, thus enabling it to accommodate four steamers of 7,000 to 20,000 tons at the same time, two on either side. Three railway tracks are laid on it on which light engines for haulage are employed. In addition, sheds were built for temporary storage, and the harbor was dredged at its mouth and near the pier to the depth of 24 to 36 shaku. This work was all completed in the fiscal year 1918 and cost Y.3,940,000.

These arrangements were all based on a maximum capacity of 700,000 tons a year, but, of late, trade through this port has increased far more rapidly than expected and reached over 1,590,000 tons in 1918, giving every sign of still further increase, so the government-general planned a second program comprising (i) enlargement of the jetty connected with Pier No. 1 to afford space for building sheds and roads on it, constructing at the same time a new quay wall 215 ken long and 50 shaku wide and making

the width of the pier 56.5 ken ; (ii) widening Pier No. 2 to 61 ken, making the middle part of it a mole and the two sides mooring piers, and constructing sheds, tracks and roads on it ; (iii) construction of a breakwater at the mouth of the harbor ; and (iv) dredging of 220,000 tsubo of the area of the harbor to the depth of 24 to 27 shaku so as to obtain a more extensive anchorage, and providing mooring arrangements in the docking area at Kitahama. This program was scheduled to be accomplished in six years from the fiscal year 1919 at an estimated expenditure of Y.9,172,000.

(b) JINSEN

Jinsen, opened to foreign trade in 1883, is a port not far distant from Kejio, and occupies a position in the foreign trade of the country second only to Fuzan. On account of the difference between ebb and flow, averaging as much as 33 skaku, great inconvenience was experienced in mooring and unloading, so the government-general enlarged the scope of the harbor works there and decided to provide it with a lock-gate dock. In form the lock-gate is exactly similar to the Panama Canal gate. The water inside the dock has an area of 30,000 tsubo and a depth of 27 to 30 shaku. One side of it, forming a quay wall 250 ken long, can accommodate three steamers of 4,500 tons, while the other side is used for unloading. To shelter the harbor and make easy the entrance and exit of ships, and to give convenience to ships mooring inside the dock, it was planned to construct a jetty between the city of Jinsen and Getsubito (an island), and a training wall 790 ken in length running south-west of Sha-to, while sheds and tracks were also to be provided. The work was started in 1911 at an estimate of over Y.7,000,000 with the expectation of finishing it in



BARON M. SAITO,
Governor-General of Chosen

the fiscal year 1922. The lock-gate dock, the principal part of the program was finished in October, 1918, and has since been in great use as the following table shows:—

		Ships Entering Harbor		Ships Entering Dock	
		Number	Tonnage	Number	Tonnage
1919	..	7,828	539,355	1,068	293,826
1920	..	7,820	535,396	1,296	343,203

total number being 24, and not a few other towns are busy making good their deficiency in this respect.

So far as management is concerned, existing waterworks are divided into two classes, those directly maintained by the government and those by localities and public bodies. To the latter a subsidy equal to half the cost of construction is granted, and, as waterworks are essentially works of local interest and ought not to be maintained either in part or in their entirety by the state, the government-general is planning the early transfer of the former class to the prefectural municipalities concerned.

Buildings

(a) GOVERNMENT-GENERAL OFFICES

The present offices of the government-general find place in the old building of the residency-general and the various additions since made, but they are not suitable as government offices either with regard to site or to equipment, so after careful investigation a site for new offices was chosen in 1912. The site selected was the front part of the grounds of Keifuku palace or north palace, and here it was planned to erect an iron-framed concrete building of five stories, including attic and basement, covering 2,115 *tsubo*, and the work was started in July, 1916, as an eight-year undertaking at an estimated expenditure of Y. 3,000,000, but the rise in price of material and labor has already added Y. 900,000 to the cost, and indications point to further increase to about Y. 3,000,000 more if the work is to be executed according to the original plans.

(b) VARIOUS NEW BUILDINGS

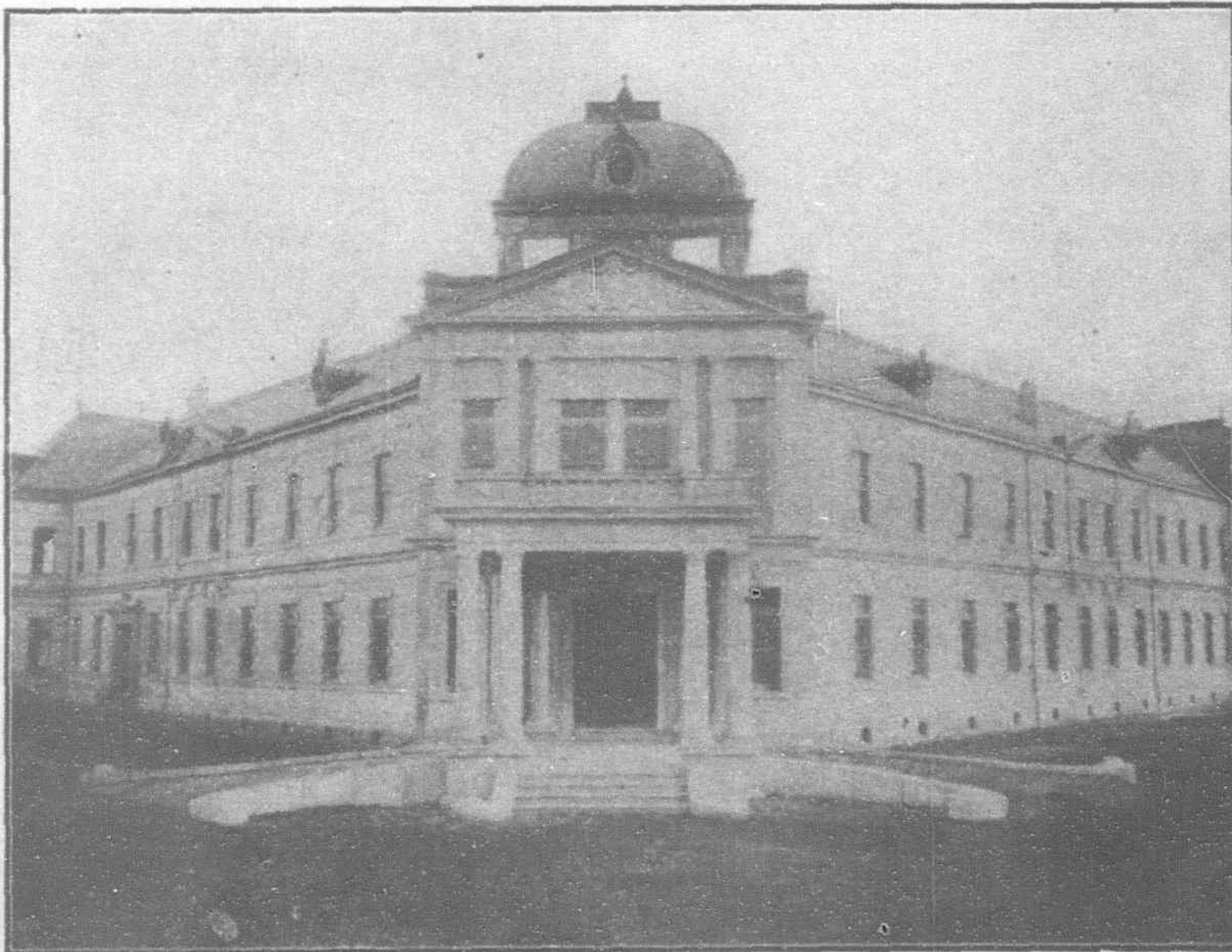
Most of the public offices in Chosen are housed in old Korean buildings, which are very inconvenient for the dispatch of business, so the government-general has been spending annually Y. 2,000,000 or Y. 3,000,000 in building provincial offices, police stations, law courts, prisons, etc., and in the fiscal year



The Bank of Chosen at Keijo



Mr. S. Minobe, Governor of the Bank of Chosen



Offices of the Oriental Development Company at Seoul

1920, on account of the introduction of a cultural policy, the building estimates were increased to Y. 9,000,000, including the Y. 700,000 annually earmarked for the building of the new government offices.

Though an extraordinary transformation has been effected in administrative affairs, no shrine for national ceremonies has yet been erected, so, by

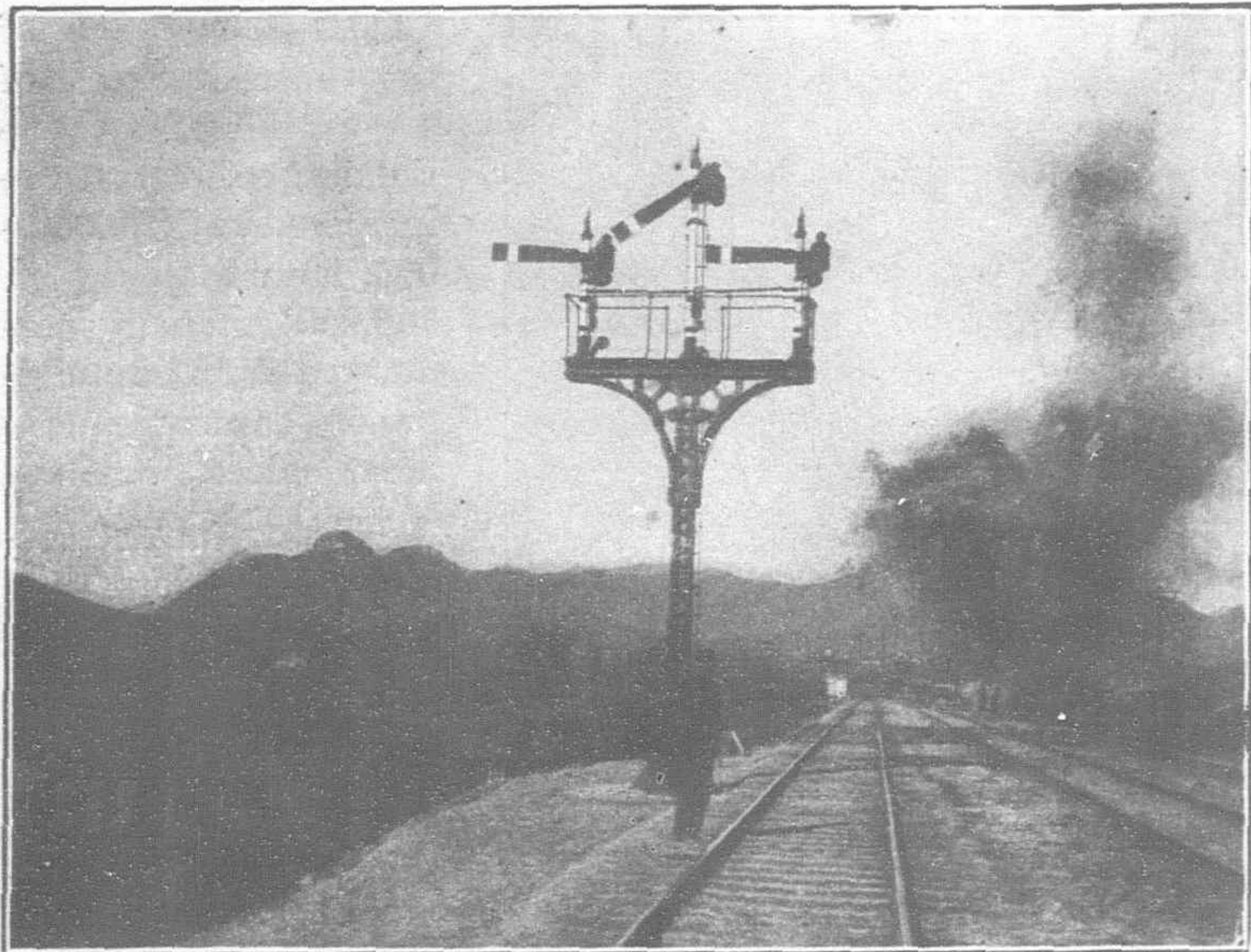
Notification No. 12 of the Cabinet in July, 1919, a site was chosen on Nanzan or South Hill, Keijo, for the erection of a government grand shrine for the veneration of Amaterasu-O-Mikami and the late Emperor Meiji at an estimated expenditure of Y. 1,500,000. Work on the Chosen shrine, as it is named, is now in progress, and the ceremony for purification of the building site was held on the 27th of May, 1920. According to the plan the site of the shrine itself and the three terraces of approach covers some 7,000 *tsubo*. The surrounding ground, about 90,000 *tsubo*, is called the Inner Garden, and there is an Outer Garden of about 110,000 *tsubo* on the eastern side of it.

Electric and Gas Undertakings

(1) ELECTRIC UNDERTAKINGS

The first electric undertaking in Chosen was the building of a tramway by the Kanjo Electric Company established by an American in 1899, and in 1901 it started the supply of electricity for lighting purposes. Similar undertakings were started in Fuzan in 1902 and in Jinsen in 1906, after which no further progress was made, and at the time of annexation electric undertakings in the country numbered but three with an aggregate capital of Y. 3,300,000 and a capacity of 1,380 kilowatts.

Japanese, however, entering more and more freely into Chosen, and the population in cities becoming more and more dense, commercial and industrial undertakings came into existence one after the other, social and economic conditions improved, and the



Nandaimon Station Yard, Seoul



Moppo Station

growing tendency to use electric light and power in Japan proper exerted its influence in Chosen, and not only was the Kanjo Electric Company bought out by a Japanese company but many other electric undertakings were promoted in rapid succession.

Previous to annexation there were no regulations for the control of these undertakings, but, after the establishment of the government-general in 1910, regulations were promulgated, by virtue of which it was necessary to obtain permission of the government before starting any new electric undertaking, and recognition by the authorities of the proposed scale of charges.

Since the framing of these regulations electric undertakings have undergone a very healthy development, and the advance in the condition of the people, especially under the influence of the situation in the fiscal years 1918 and 1919, caused the demand for electric power to increase greatly, and at the end of the fiscal year 1920 there were 37 electric undertakings under way, of which 28 were actually at work, having a total capital of Y.48,950,000 of which Y. 17,710,000 was paid up, and a capacity of 35,500 kilowatts. In addition to these there were ten undertakings run by the government for its own use, and 42 private ones.

In former times almost all electric undertakings in Chosen depended upon heat for their motive power, only two or three making use of water-power, so in 1911 the government-general began to make investigation of water-power that might be utilized for generating electricity, and completed it with respect to eleven of the larger rivers, such as the Rakuto, Kan and Daido, and part of the

Oryoku, in the fiscal year 1914, discovering thereby 80 sites capable of generating 76,000 h.p., of which 39 with a combined capacity of 33,900 h.p. were regarded as of easy and profitable management, and these were surveyed and work started on them, and, as the healthy development of electric undertakings requires long years and close investigation, the government-general is thinking to make of these reliable object-lessons to those intending to start similar works elsewhere.

(2) GAS UNDERTAKINGS

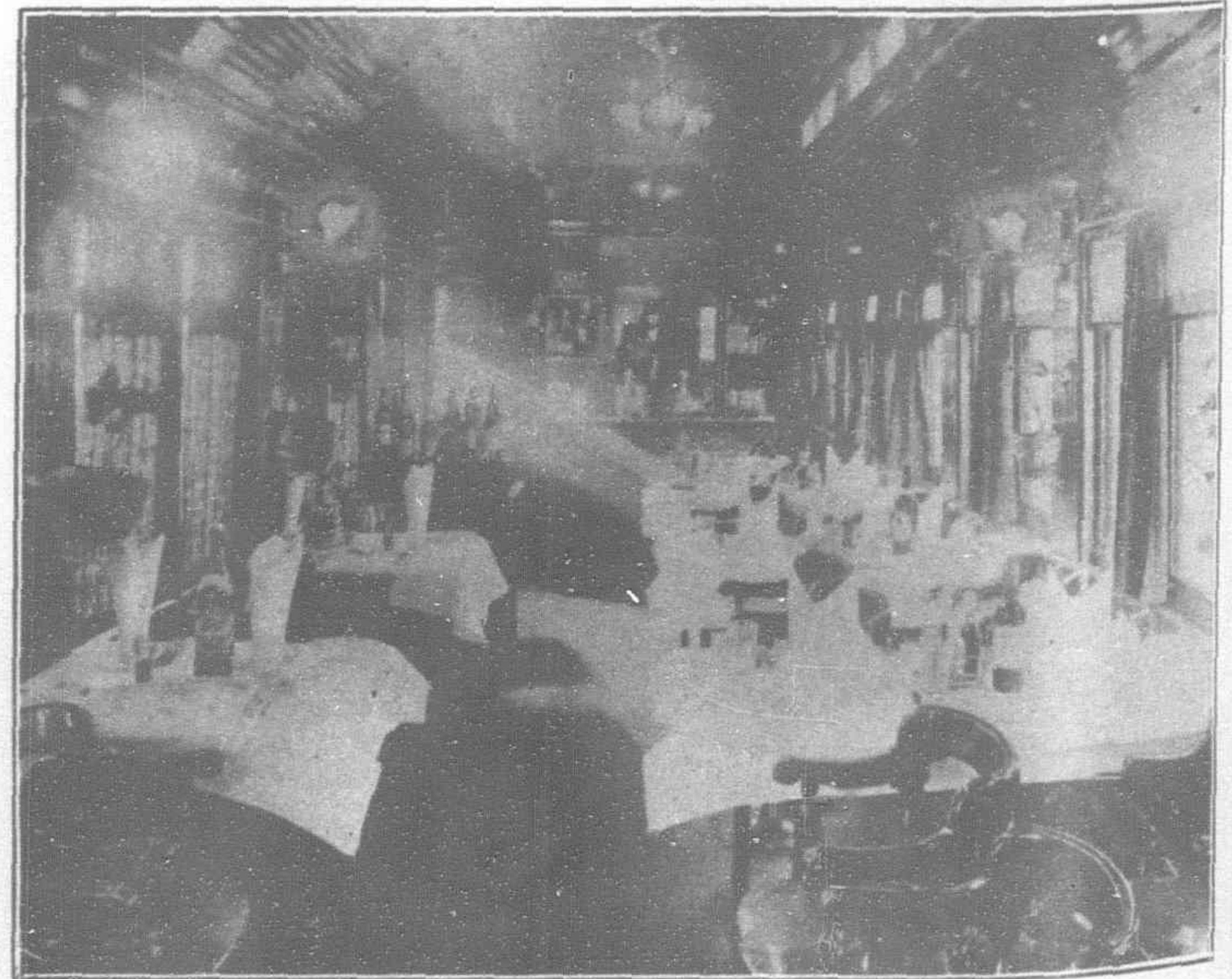
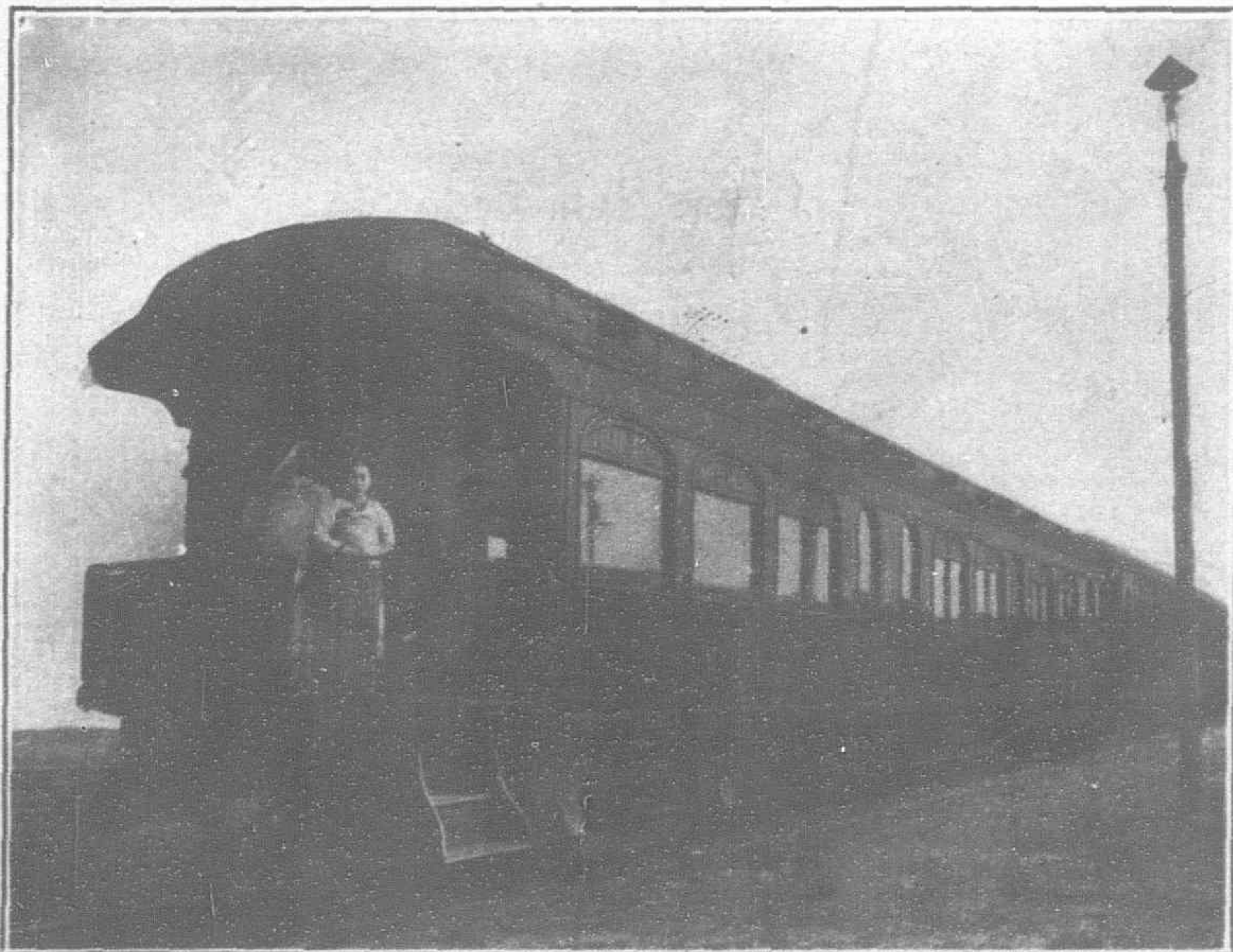
There are two gas-producing undertakings in Chosen, one at Keijo and the other at Fuzan, both being carried on as branch works by electric companies. The former started work in 1909 and the latter in 1912 on an aggregate capital of Y.2,200,000, and the gas produced by them reached 141,690,000 cubic feet in the fiscal year 1919.

Control of gas undertakings was formerly exercised by the police authorities, but, as they are carried on by electric companies, they were put under the supervision of the communications bureau in May, 1919, in order that control of both businesses might be uniform.

Railways

(1) STATE-OWNED RAILWAYS

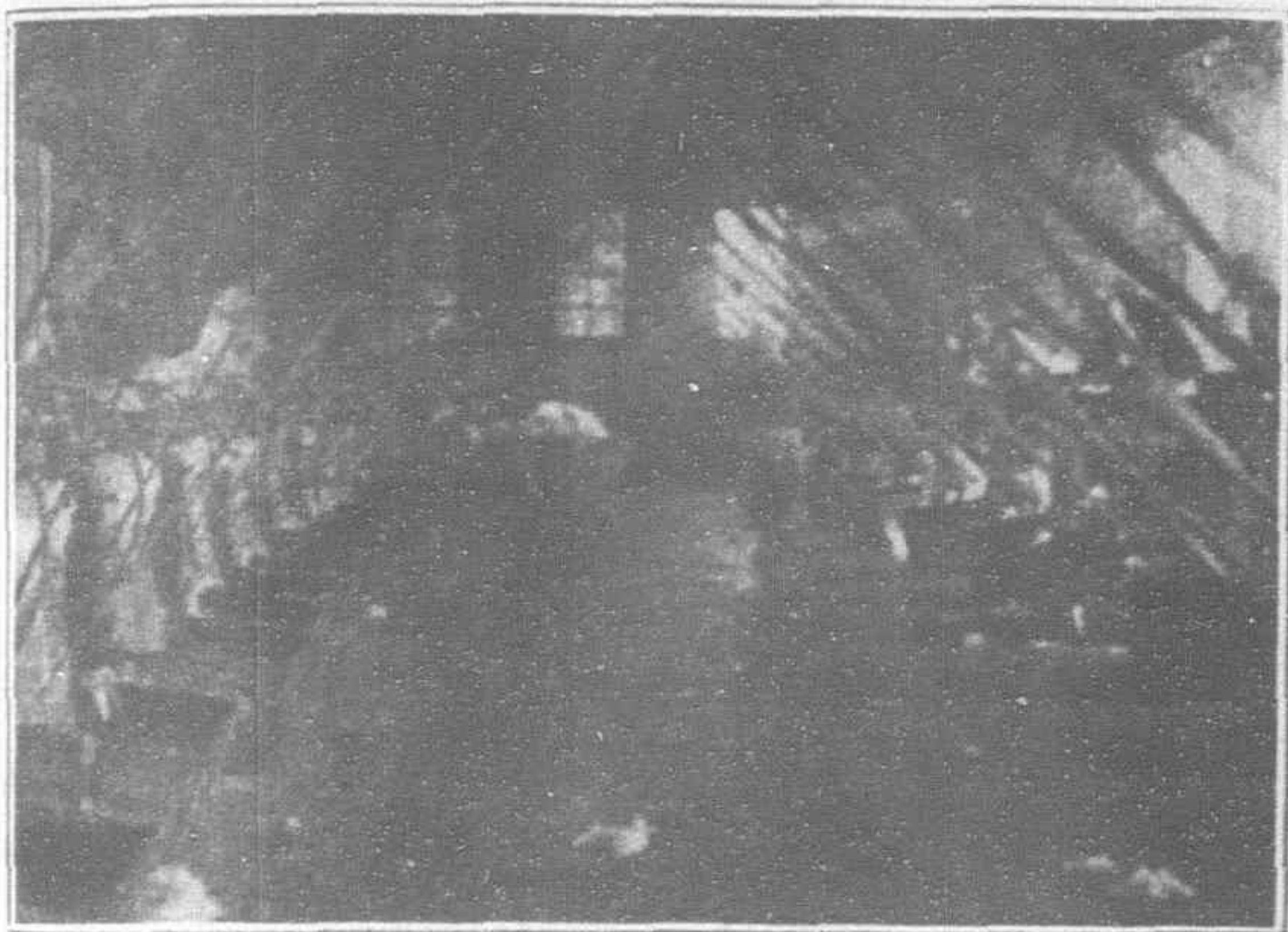
The first instance of a railway in Chosen was the Keijo-Jinsen line opened for general traffic in 1899 by the Kei-Jin Railway Company. In 1901 the Kei-Fu Railway Company was established



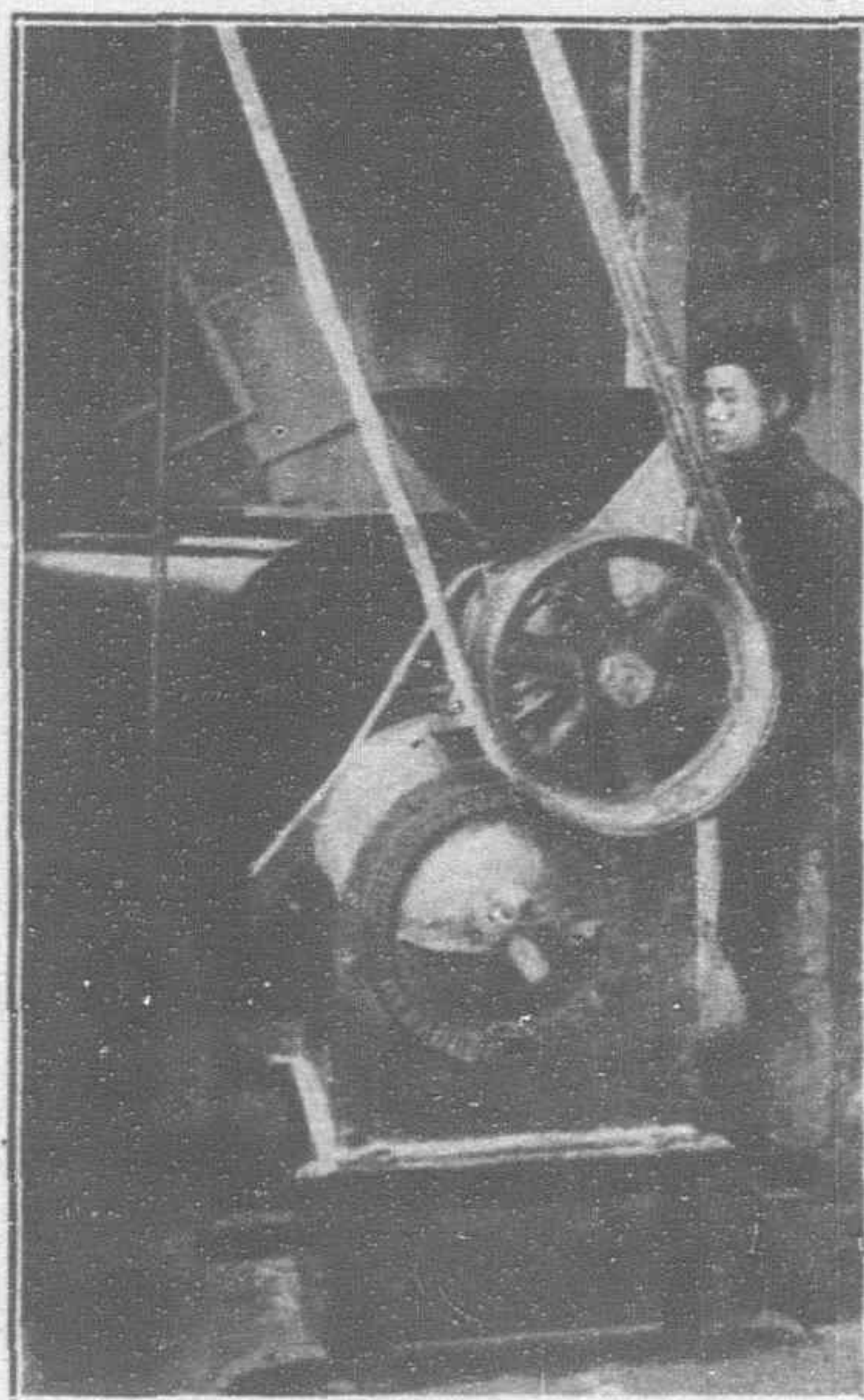
Luxurious Traveling on the S.M.R. Express through Korea; Observation and Dining Cars

and began the construction of the line between Keijo and Fuzan, and in 1903 bought the Kei-Jin line. In 1904 the line between Keijo and Fuzan was opened to traffic, and in 1905 the line between Keijo and Shingishu and the Bazan Line were completed for the use of the army during the Russo-Japanese war. In 1906 the Japanese imperial government bought out the Kei-Fu Railway Company and took over the Keijo-Shingishu and the Bazan lines from the department of war, and all were placed under the control of the railway superintendence bureau of the residency-general. In 1909 they were again made part of the Japanese government railways, but, on the government-general being established in 1910, control of them once more changed hands. During all this time improvement and construction work was steadily carried on, and the year 1910 saw the completion of the line between Heijo

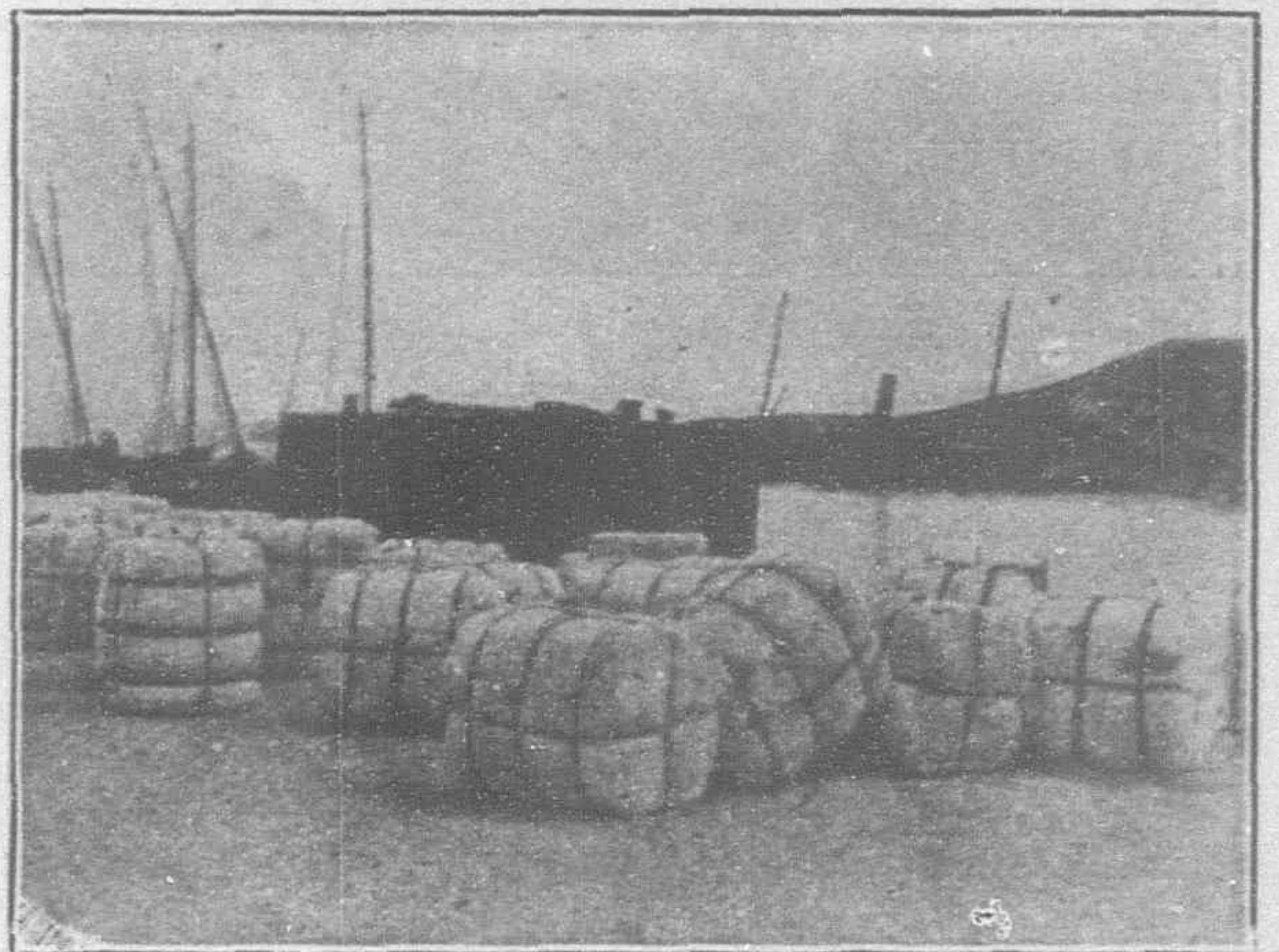
the South Manchuria Railway Company for twenty years, on condition that the net earnings to the equivalent of 6 per cent. on the total amount of capital furnished by the government-general since the fiscal year 1911 were paid over to the government-general each year, and in the event of the profit gained falling short of that amount in any one year the deficit to be made good out of the profits of succeeding years, while should the profit exceed the amount required, half such excess was also to go to the government-general. This arrangement, however, leading to some amount of inconvenience in settling accounts, another contract was concluded between the government-general and the South Manchuria Railway Company on the 23rd of July, 1918, relieving the company from paying over the half of any excess profit obtained but requiring it to bear construction costs.



Cotton Ginning in Korea



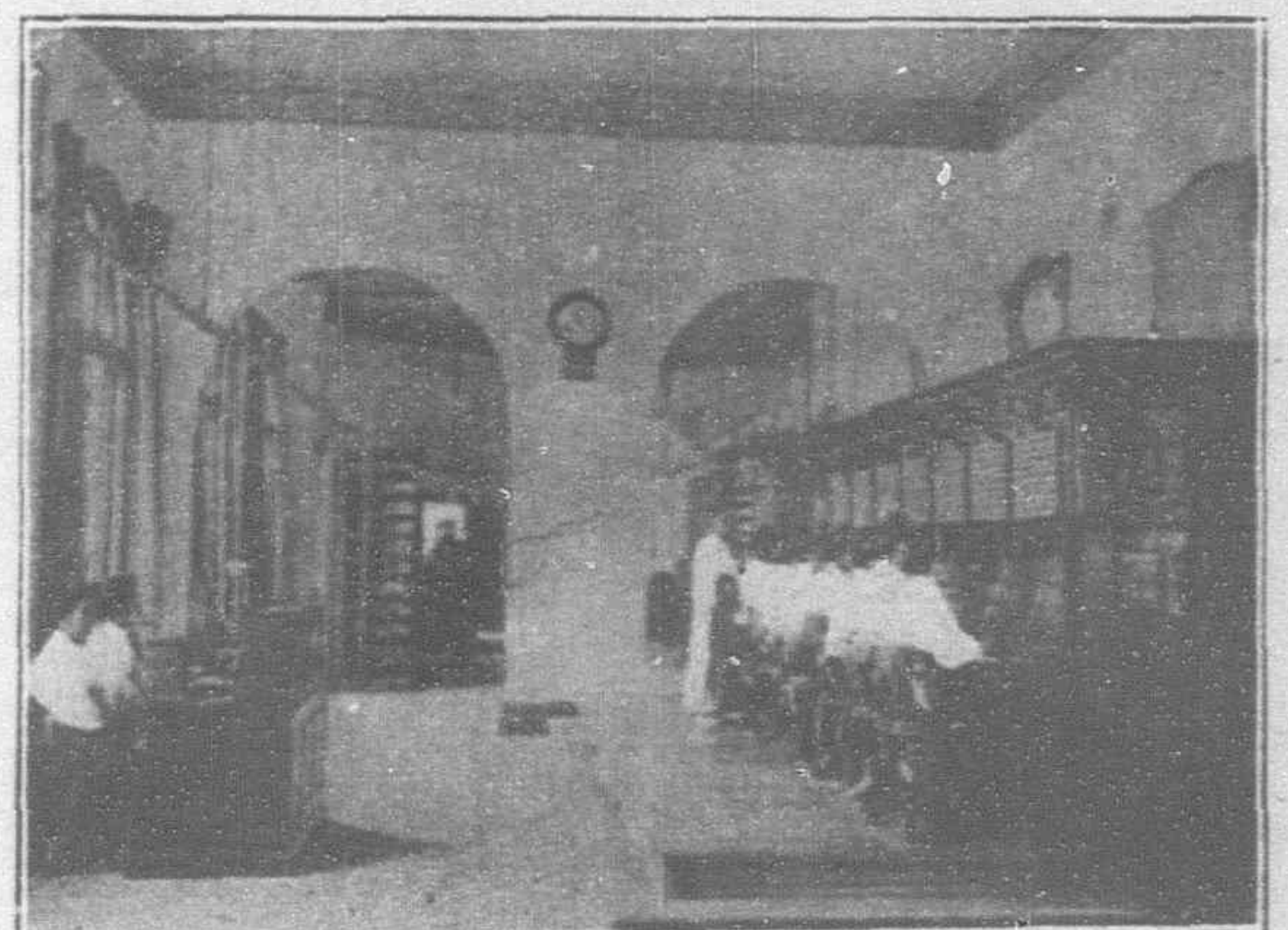
Rice Cleaning Machine



Ginned Cotton ready for Shipment



Telegraph Room at Fusan Post Office



Telephone Exchange at Fusan Post Office

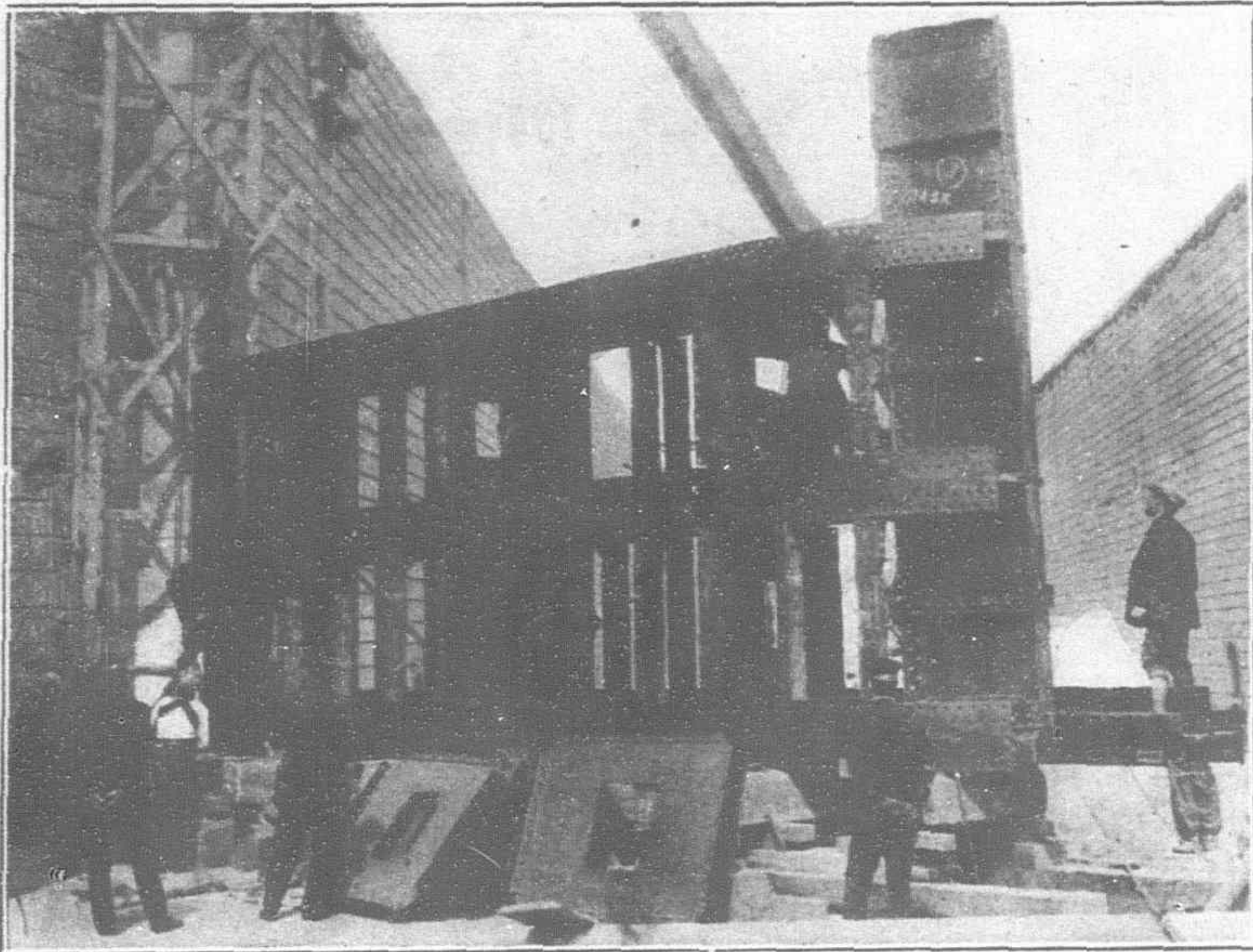
and Chinnampo; in 1911 the Oryoku was spanned by an iron bridge, thus connecting the railways in Chosen with the South Manchuria railway; in 1914 the line between Taiden and Moppo and that between Keijo and Genzan were completed; in 1915 part of the line between Genzan and Kwainai was opened. The last named is still in the course of construction, but traffic is already regularly conducted between Seishin and Kwainai in its northern part and between Genzan and Kanko in its southern part, and at the end of the fiscal year 1920 the total mileage of state-owned railways open to business in Chosen was 1,157 miles.

Single control of the railways in Chosen and Manchuria being considered advisable on account of their economic and communicative relations, the government-general, in accordance with the imperial ordinance of the 31st of July, 1917, concluded a contract with the South Manchuria Railway Company and entrusted to it the management of all the state-owned railways in Chosen: no and after the 1st of August.

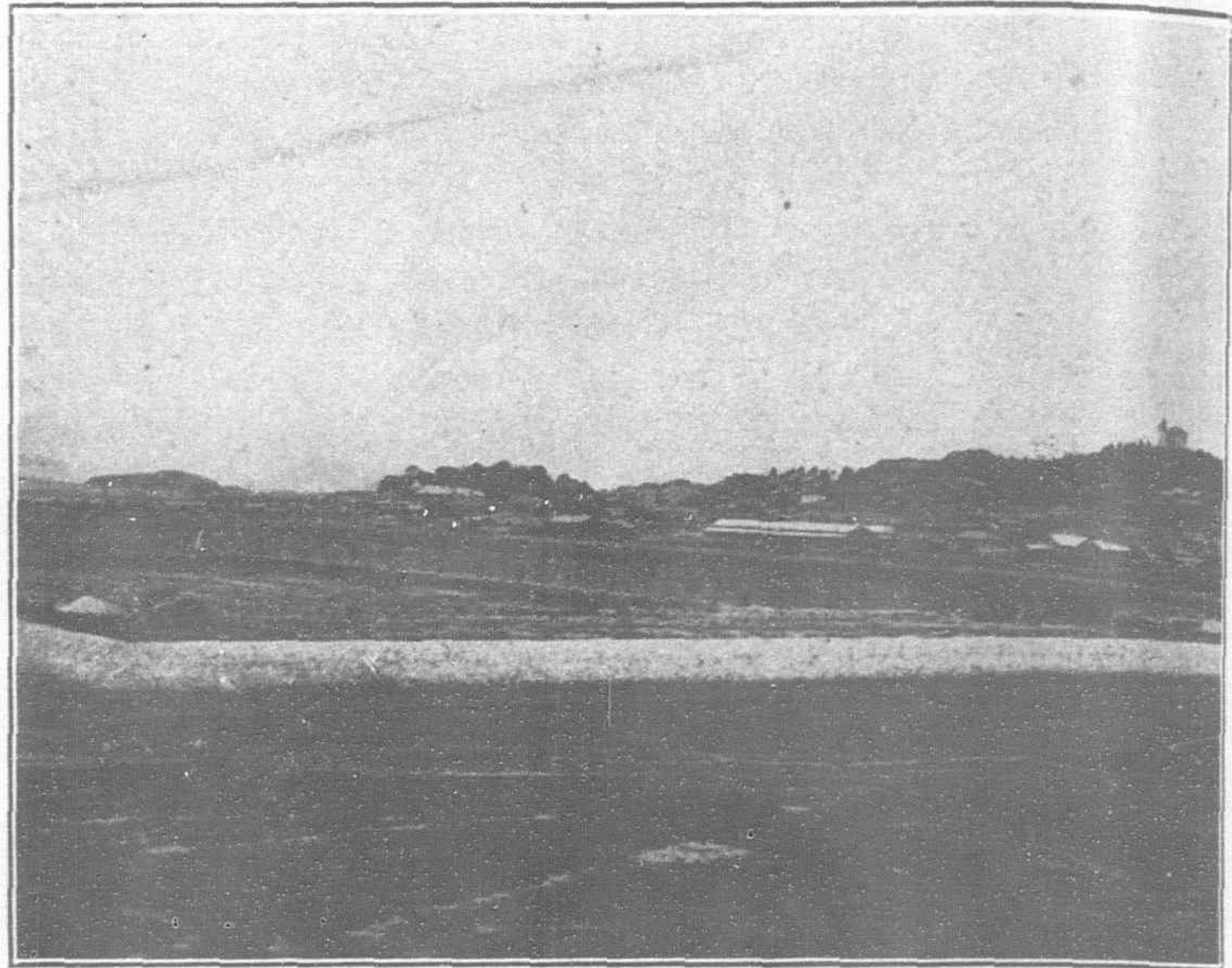
According to the contract above mentioned, the entire management of the state-owned railways in Chosen, except the formation of plans for new construction and improvement and the provision of capital for the purpose of carrying them out, was entrusted to

The railways in Chosen, by bridging the Oryoku and making connection thereby with the Manchuria railway and with European railways by the Chinese Eastern Railway, have become part of the international railway system, and this has resulted in direct communication between Fuzan and Mukden. To further this, the ferry-steamers between Shimonoseki and Fuzan have been made to run more frequently, and direct communication between Japan and Manchuria and between Japan and China, has been established. Though the railway business suffered for a time through the Great European War, it was not long before it regained its former activity, and even surpassed it, owing to the deficiency in bottoms, so that of late years congestion of goods at every station has been the rule owing to the development in productive industry, and this has necessitated increase in the number of locomotives and trucks, and a closer co-operation between the government railways and forwarding agents. The following table gives some idea of the railway development:—

Fiscal Year	Length Miles	Passengers Miles	Freight Tons	Receipts Yen
1920 ..	1,157.4	12,421,441	3,186,073	23,816,807
1919 ..	1,153.2	12,184,485	3,642,829	21,635,968
1910 ..	674.6	2,024,490	888,723	4,095,752



Lock Gates in Course of Construction for the Jinsen (Chemulpo) Harbor Works



The Jinsen Wet Dock in Course of Construction

Though railway rates and charges had not been revised since 1912, the increase in expenditure owing to the rise in price of commodities at length required this to be done, but great care was taken to make them no higher than absolutely necessary.

The hotel business as an adjunct to the railway business was first started at Fuzan in 1912 for the convenience of foreign tourists by making use of the upper stories of the station there, and later on in Shingishu. In 1914 the Chosen Hotel was established on a large scale in Keijo, and a branch of it at Kongozan for the convenience of sight-seers there.

Warehouses were established in 1913 at Keizan and ten other places, and as time went on were erected in other important centres. Storage yards were also prepared to cope with the prevailing congestion, and at the present time 67 points along the railways are provided with warehouses or sheds.

As regards new construction and improvement of existing lines, the Kei-Fu line has been continually improved since the fiscal year 1914, while the new lines Taikyu-Kinsen and Taiden-Fuko were completed in the fiscal year 1916, and the Kinsen-Taiden in the fiscal year 1919, while the new line between Soryo and Fuzanchin and that near Keijo are now in the course of construction. The Kankyo line in the north-east between Genzan and Kwainai totals over 376 miles in length and has a branch line running between Yujo and Seishin. Of this the parts between Genzan and Eiko and Seishin and Kwainai were completed in 1916 and 1917 respectively, between Eiko and Kanko and Yujo and Ranan in 1919. In the west the Keijo colliery railway bought the line between Birin and Shokorai from the Onoda Cement Company and opened it to business in 1918, and the Konan line started work on a track between Taiden and Moppo and between Riri and Gunzan in 1910 and opened both to business in 1914.

Of the lines now in the course of construction or projected for future construction, the Kankyo line will be completed in the fiscal year 1926, the Chinkai line in the fiscal year 1925, the new line between Heijo and Genzan will soon be begun, and a double track

between Keijo and Fuzan and between Keijo and Shingishu will be laid, and new lines between Kanko and Manpochin, Bazan and Shoteiri, Genzan, Koryo and Fuzanchin, Keijo and Koryo, and Shinanshu and Kokai, started as soon as financial conditions will allow.

(2) PRIVATE RAILWAYS AND TRAMWAYS

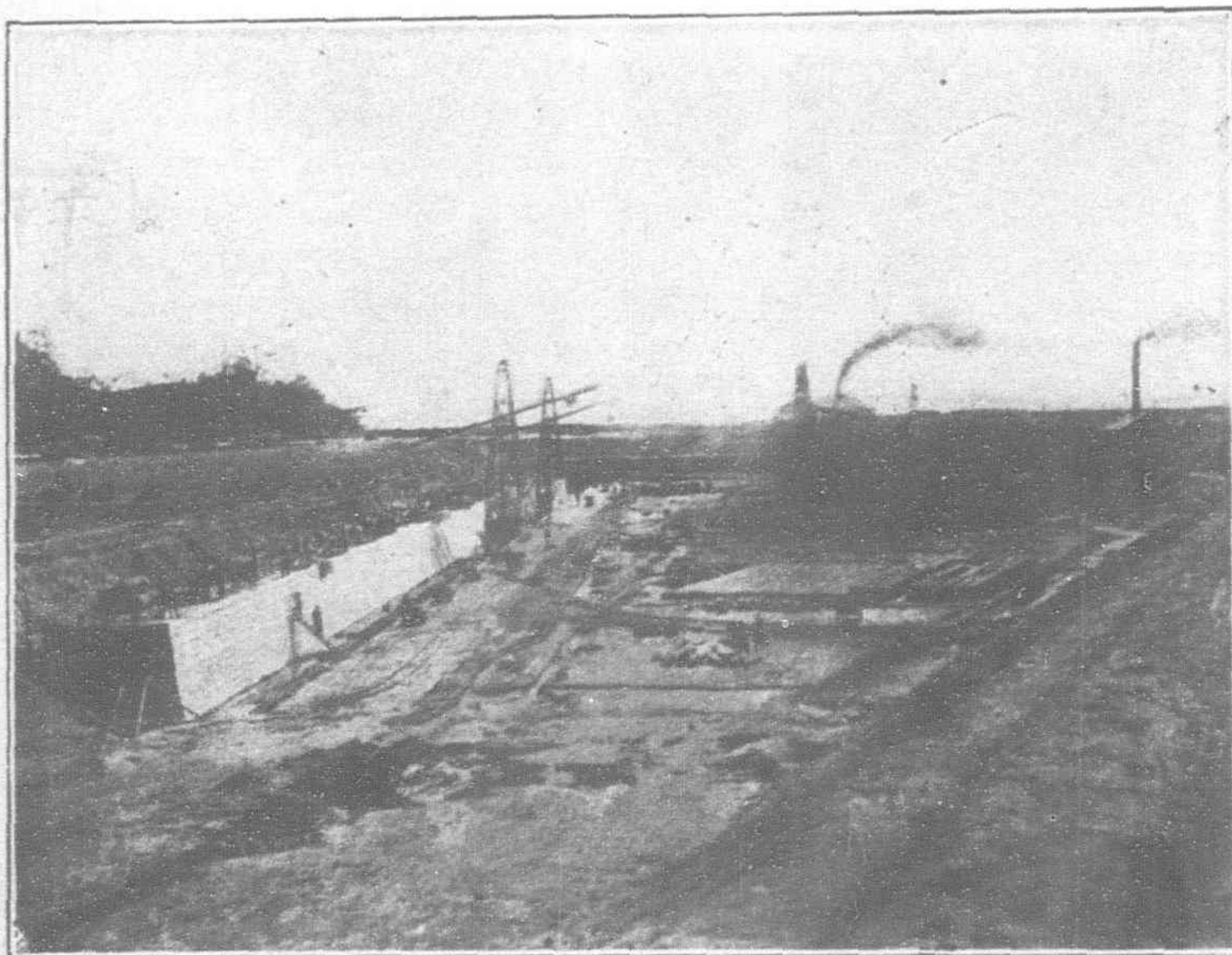
For the encouragement of private railways and tramways, the government-general promulgated the Chosen light railways regulations in 1912, making provisions for their supervision and protection, and since then has annually sent officials to investigate projected private railway lines. In the fiscal year 1914 it also made provision for granting subsidies to important lines to meet any deficiency in profit below a certain percentage on the paid-up capital of the company favored.

Up to 1917 the rate was 6 per cent., and this was raised to 7 per cent. in 1918 and to 8 per cent. in September, 1919. On the reforms in the government organization being effected, new regulations relating to the subsidies to be granted them were drawn up and were promulgated at the end of the fiscal year 1920.

As the light railway regulations also required revision owing to the progress of the times, the Chosen private railway regulations were published in June, 1920, limiting the motive power to steam and electricity, and determining the gauge at 4-ft. 8.5-in. as a rule. They also provide for making increase in capital, floating debentures, amalgamation of companies and various other matters.

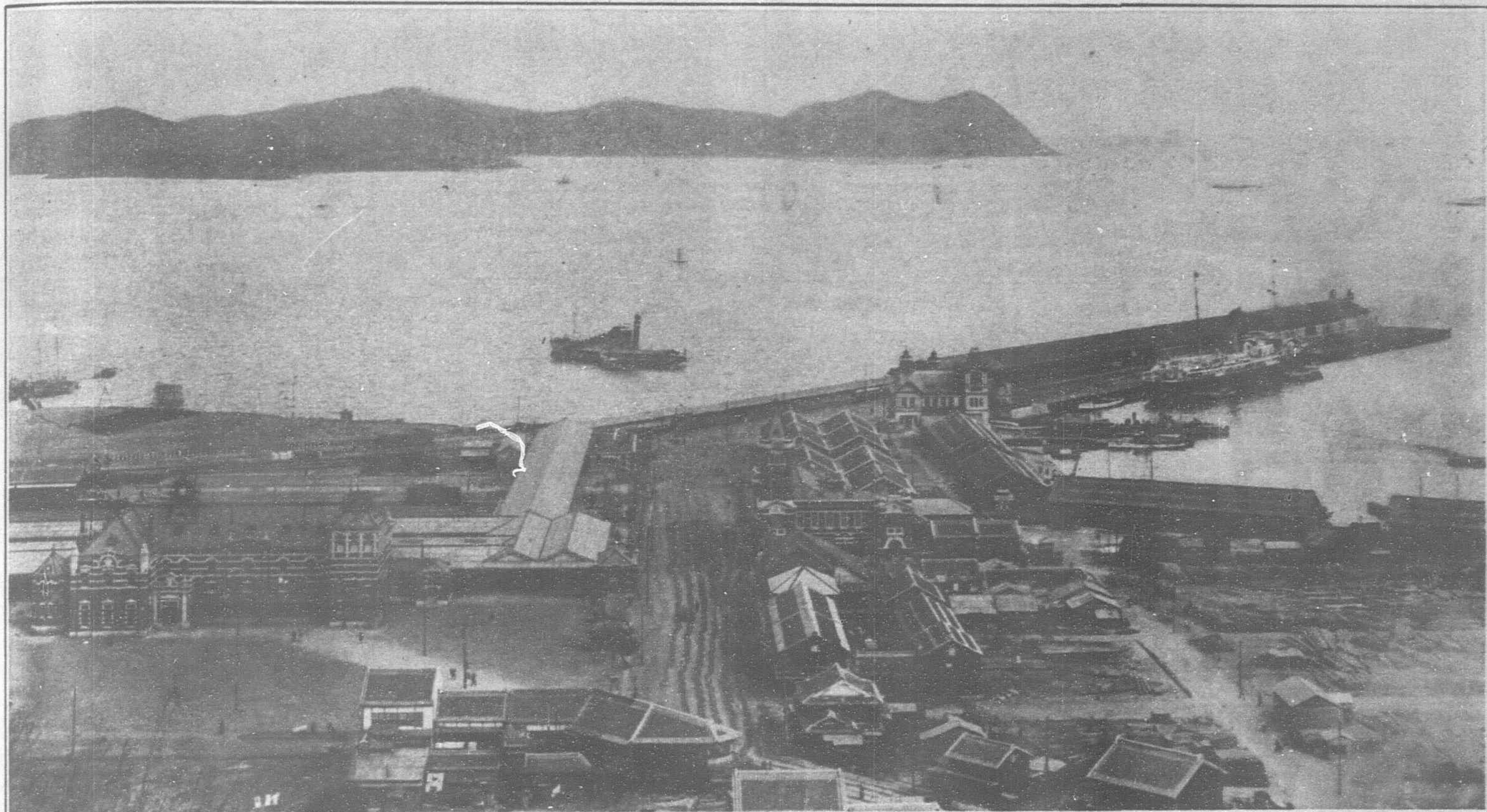
Factories

Except for some few run by Japanese and foreigners, factories on modern lines were practically non-existent in Chosen prior to the great European war, but the abnormal conditions induced by that war quickly brought about a change, and the 328 factories with an aggregate capital of Y.13,000,000 existing in 1912 increased to 1,700 in 1918, and to 1,900 in 1919 with an aggregate capital of Y. 129,000,000. In the following table are enumerated the most important manufacturing companies established in

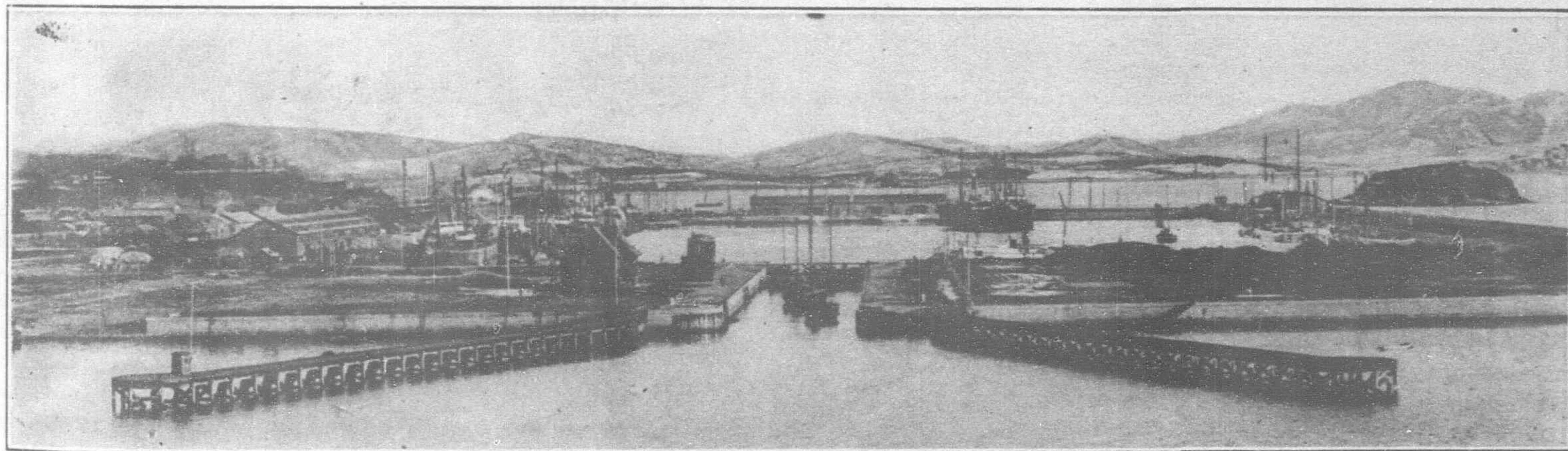


Construction Work on the Chinnampo Harbor

HARBOR CONSTRUCTION IN KOREA



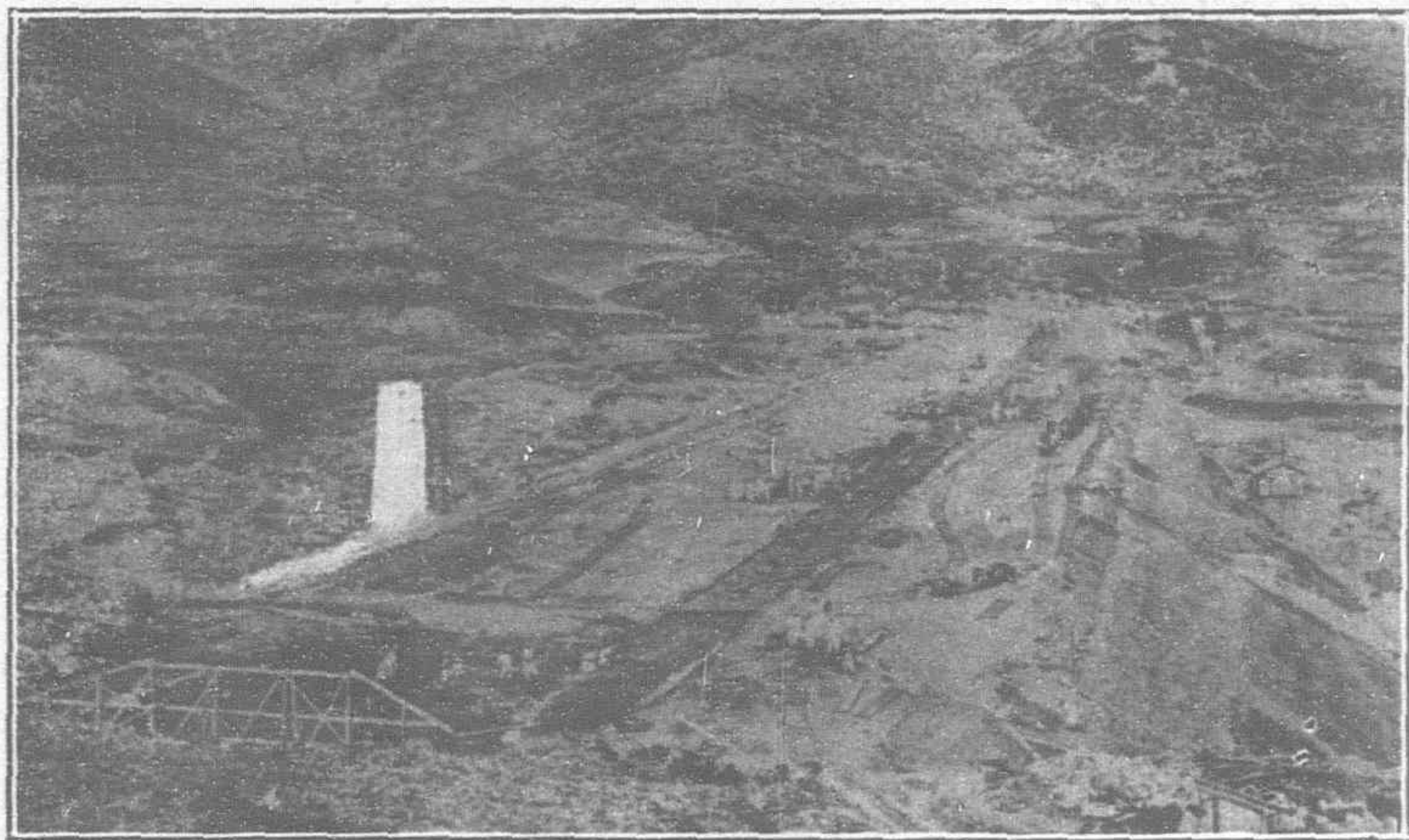
The New Pier and Railway Terminus at Fusan



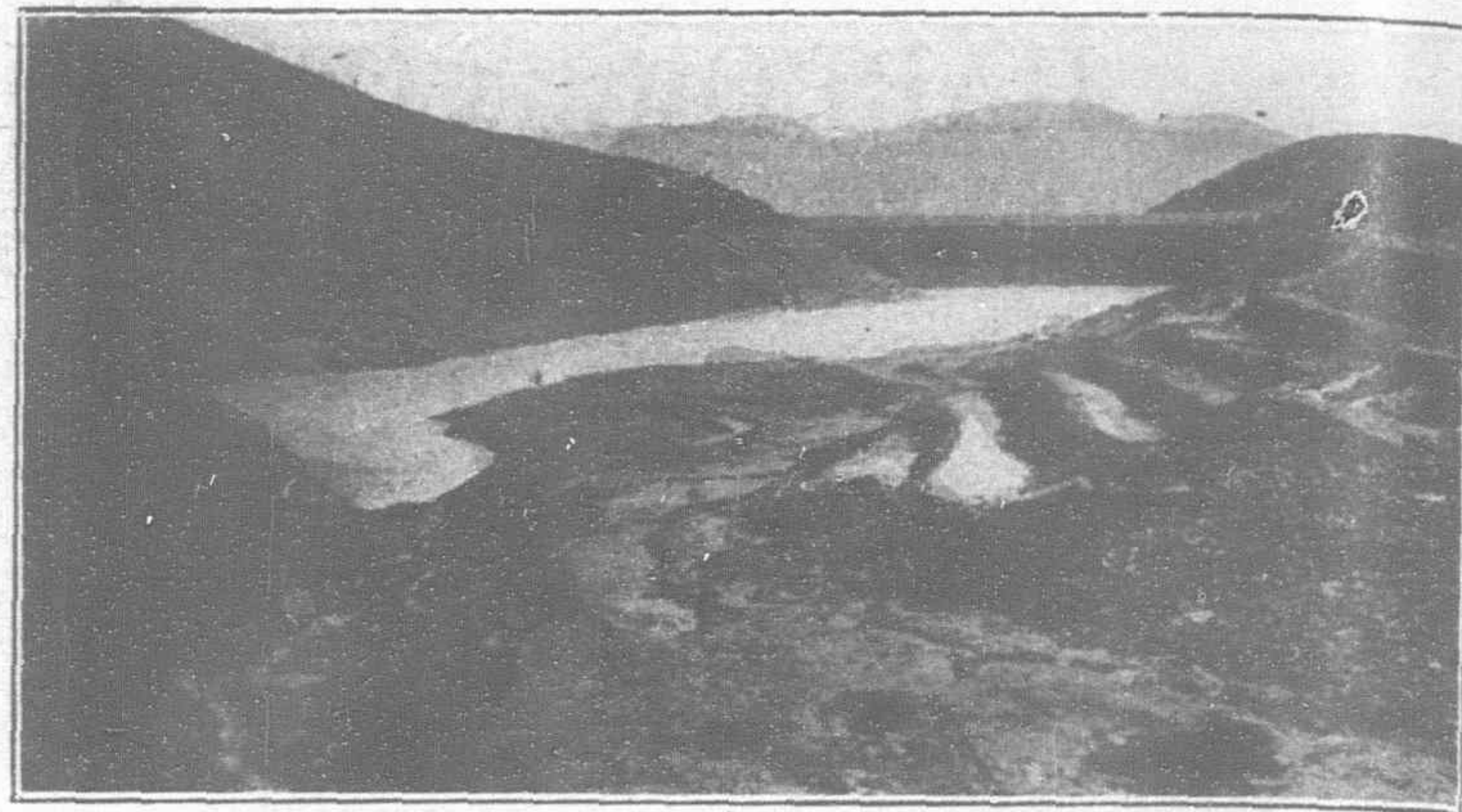
The New Wet Dock at Jinsen (Chemulpo)



Construction of the Jinsen Harbor Dock



Reservoir of Chinnampo Waterworks in Course of Construction



Reservoir of Fusan Waterworks in Course of Construction

1918 and 1919 with a capital of Y.500,000 or more :—

Name of Factory	Year of Establish- ment	Output	Capital	Composition
			Yen	
Chosen Flour Company	... 1918	Wheat flour	1,000,000	Japanese
Chosen Oil Company	Cotton-seed oil	500,000	..
Chosen Starch Company	Starch	500,000	..
Keijo Reeling Company	Silk-thread	500,000	Korean
Keijo Spinning Company	Weaving and spinning	1,000,000	Korean
Onoda Cement Company	Portland cement	1,800,000	Japanese
Chosen Raw Silk Company	... 1919	Raw silk	1,000,000	..
Chosen Electric Industrial Company	Electric power and bricks	10,000,000	..
Asahi Brewing Company	Refined saké and distilled spirits	1,500,000	..
Chosen Distilled Spirit Company	Distilled spirits	500,000	Japanese and Korean
Seisen Ginning Company	Ginning cotton	1,000,000	..
Dai Nippon Sugar Company	Cane-sugar and beet-sugar	20,500,000	Japanese
Mansen Dye-stuff Company	Maple-leaf ex- tract	1,000,000	..
Chosen Fertilizer Company	Bean cake and bean oil	3,000,000	Japanese and Korean

(3) LUMBER UNDERTAKING STATION

The Lumber undertaking station is the special government office controlling the state forests covering about 2,200,000 *chobu* in the basins of the Oryoku and Toman, and engages in various kinds of work tending not only to improve the forests themselves but to improve their indirect utilization.

The principal trees in the forests are mostly those found in the frigid zone, such as the larch (*larix davurica* var. *principis-ruprechtii*), fir (*picea jezoensis* and *abies holophylla*), birch (*betula schmidtii*), and aspen (*populus tremula* and *populus suaveoleus*), all valuable for utilitarian purposes.

The investigation of the forests, undertaken as a ten-year consecutive work from the fiscal year 1913, consists of two kinds, that is, investigation of the boundaries of the state forests under the control of the station, and investigation regarding their afforestation,

and of the former 1,780,000 *chobu* and of the latter over 910,000 *chobu* had been worked over by March, 1910.

As for afforestation, not only is the natural way utilized but plantation on a large scale is carried on, seedlings of the most suitable varieties for this region being raised in special nurseries.

For the proper protection of the forests the station has established branches to guard against wilful damage being done to them, and since the fiscal year 1915 protection unions have been organized in that region to the advantage of both officials and people, and these numbered 255 in March, 1920, guarding an area of over 610,000 *chobu*. As they are not yet thought sufficiently numerous for the purpose, it is proposed to encourage the organization of 60 more such unions.

Felling and logging form part of the work done by the station, but private individuals also engage in it. These have standing trees sold to them by the government, and the logs made by them are transported to suitable points on the rivers and there rafted and floated down the Oryoku and the Toman to Shingishu and Kwainei respectively.

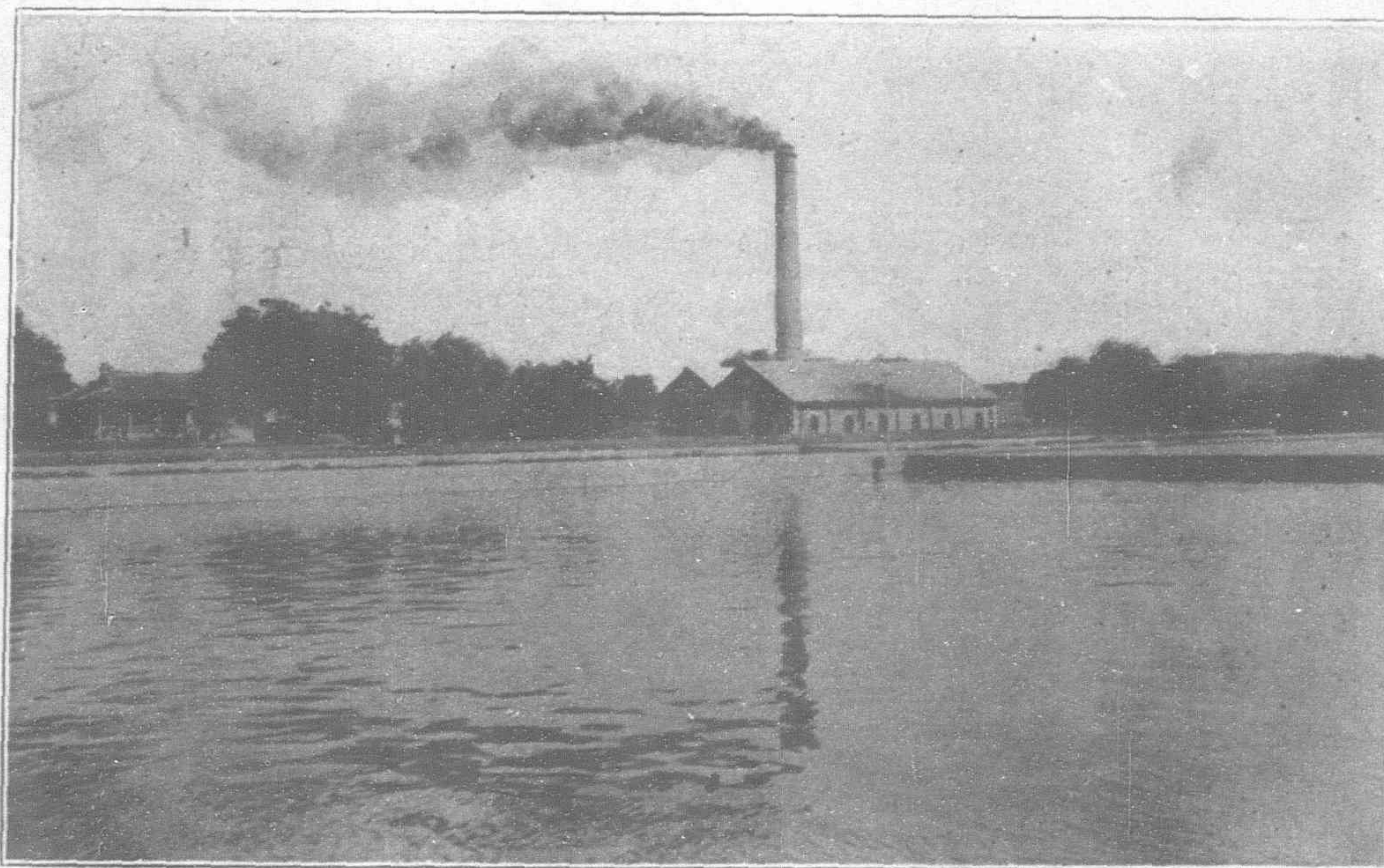
The following table shows how logging has been carried on for the past three years :—

	Logs Cut <i>Cubic shaku</i>	Logs Arriving at Station <i>Cubic shaku</i>
1918	3,396,000	3,840,000
1919	3,888,000	3,480,000
1920	2,796,000	3,240,000

Preparing timber was first done by private mills under contract, but as this proved unsatisfactory to the contractors and was uneconomical to the station, a saw-mill was bought by the

station in Shingishu, the seat of the station itself, in 1909 and enlarged, and was found of great assistance in keeping a happy mean between the supply and demand of timber in Chosen.

Timber prepared by the station finds its market mostly in Chosen, but a small demand for piles and sleepers comes from Manchuria. Even in Chosen it was at first prepared only for the use of government offices, but of late years it has become recognized as of ex-



Reservoir and Pumping Station of the Keijo Waterworks

cellent quality and, the credit system being introduced, the demand increased so much, especially on account of the boom induced by the great war, that the station began to find it impossible to meet it, but in 1920 the demand waned somewhat owing to the depression in economic circles.

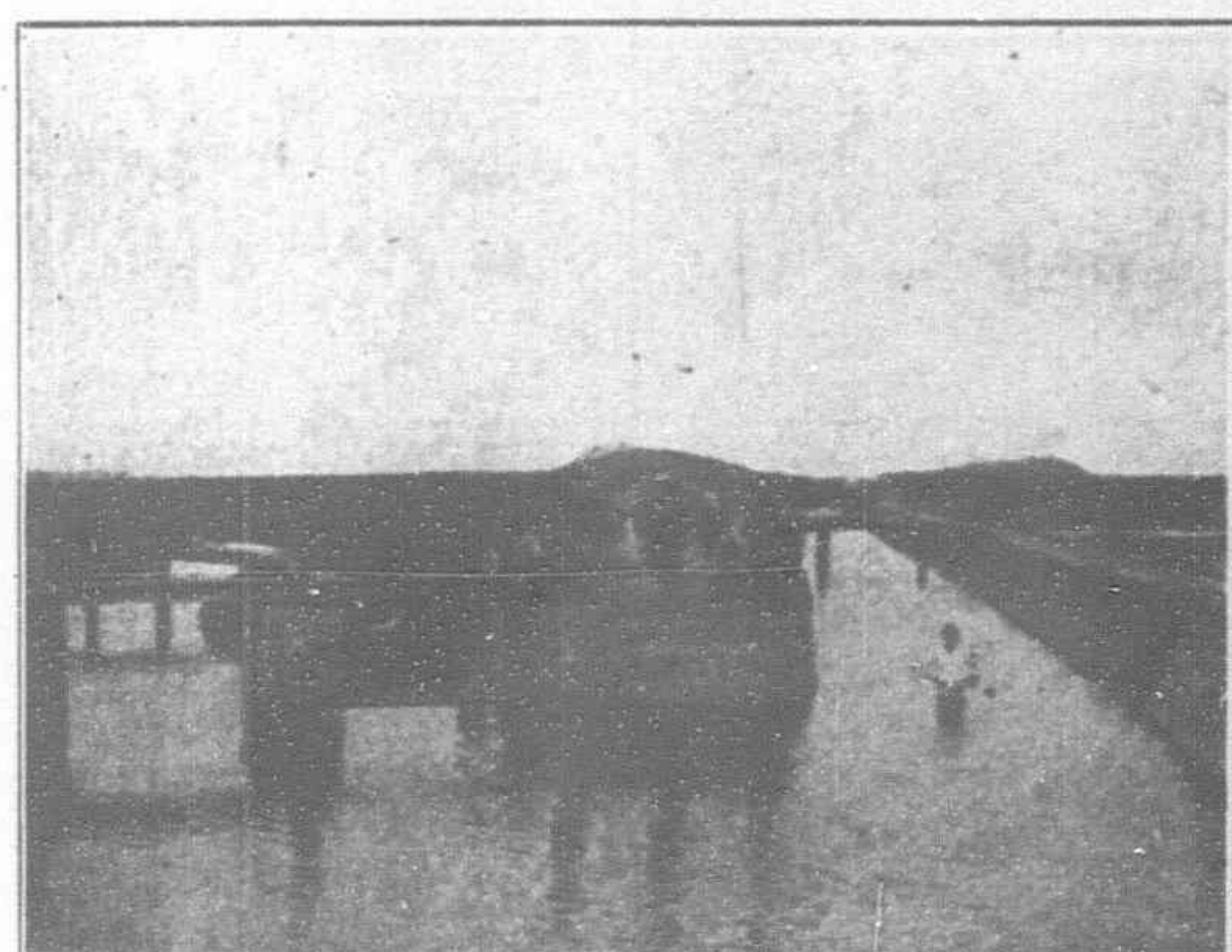
The following table gives the quantity of prepared timber and the receipts from connected sales:—

	Quantity of Timber Cubic shaku	Receipts from Sales Yen
1918	1,884,000	2,251,000
1919	1,956,000	2,935,000
1920	1,548,000	2,623,000

This undertaking was originally jointly financed by the Japanese and the Korean governments under the management of the resident-general. After the annexation the government-general took it into its own hands and made great improvement in its efficiency, and in the fiscal year 1918 secured from it a profit of Y. 940,000 a really amazing increase compared with the Y. 80,000 in the fiscal year 1910.

(4) HEIJO COAL MINE STATION

The Heijo coal mine station is actually engaging in the mining of anthracite coal in Jido and Kozanbo in Daido district, Heian-Nan-do, the coal-beds covering about 124 square *ri*. As there is not as yet a very general demand from the people for such coal, it is mostly disposed of to the naval briquette factory at Tokuyama in Yamaguchi prefecture, Japan proper, the



Irrigation Canal, Korea

rest being sold to the public in the form of briquettes. As the coal-fields cover so large an area, there has recently been granted mining rights over some part of it to various mining companies, and the actual area retained by the station itself has been reduced to 47,000,000 *tsubo*, the amount of coal that can be safely mined being estimated at 66,000,000 tons. The coal mined by the station is almost all dust, containing over 8 per cent. of volatile matter and over 82 per cent. of fixed carbon, its calorific intensity being rated at 8,000 calories.

The undertaking was begun in 1902 and was taken over by the government-general in 1910, and between 1909 and 1911 the equipments in the mining districts at Kobozen and Jido were enlarged, and, on the demand for dust and briquettes increasing, extension works were begun in part of Kobozen and in Ritsuri and Butsudori in July, 1917, and being completed in March, 1920, it is estimated that the annual production of coal at full working capacity is 300,000 tons, as against a former output of some 100,000 tons.

The station has also a briquette factory at Jido with a capacity of 100 tons a day. The manufacturing of briquettes by the government was started in 1911, and two kinds of briquettes of small size are turned out by it for use in stoves and fireplaces, and *ondols*

and kitchens, and the demand for them is increasing year by year. It is now planned to turn out a large size for use on the railways.

The annual production of coal by the station was at first not more than 40,000 to 50,000 tons, but the demand by the navy increasing, it rose to about 120,000 tons, and on Japan joining the allies in the great European war rose to as much as 150,000 to 180,000 tons, but this decreased somewhat when the war came to an end. The annual production of briquettes was at first not more than 5,000 to 6,000 tons, but as recognition of their convenience in use became more general this too increased and is now over 20,000 tons.

The following table shows the production and receipts from it for the last three years:—

	Output Tons	Briquettes Tons	Total Receipts Yen	Net Profits Yen
1918	140,773	20,043	1,015,898	162,334
1919	128,274	24,187	1,599,241	167,063
1920	140,250	15,542	2,982,380	299,773

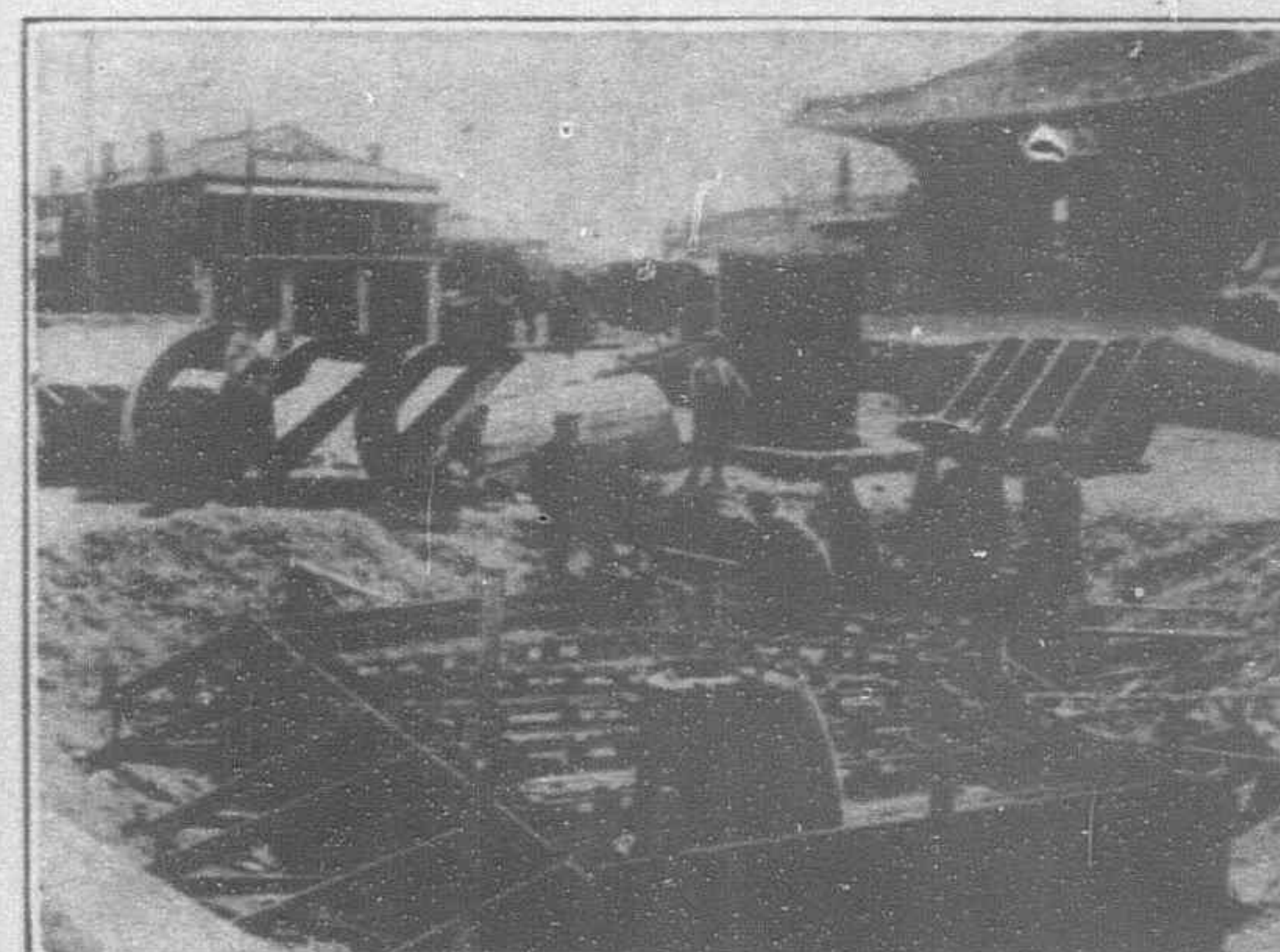
The coal-fields belonging to the station have been thoroughly investigated by various methods since the beginning of the undertaking, and similar work since carried on relates to the whereabouts of rocks and of seams lying deep in the ground.

(3) AGRICULTURAL WATER-UTILIZATION

As for water-utilization in Chosen, thanks to the regulations relating to water-



Sewer Construction in Keijo



Sewer Construction, Keijo

utilization associations promulgated during the protectorate régime, and the protection and control of private irrigation undertakings since the establishment of the government-general, dependence upon rain-

water, which was all but general before the annexation, waned so much that at the end of the fiscal year 1918 twenty per cent. of the total area of 1,544,000 *chobu* of paddy-fields, or about 328,000 *chobu*, was provided with irrigation arrangements, of which 289,000 *chobu* were irrigated by ponds and dams, 31,000 *chobu* by water-utilization associations, and 7,000 *chobu* by private works. The remaining 80 per cent. depends entirely upon rain-water, and produces only 1 *koku* per *tanbu* even in a most successful year, such as 1918 was, that is, only half the yield obtained in Japan proper, so the encouragement of water-utilization associations is being vigorously pursued.

The irrigation ponds and dams existing in former times numbered over 6,000 and 20,000 respectively, but so consistently had they been neglected that they were all but worthless, so subsidies were given from 1909 to 1918 to encourage their repair and maintenance in good order, with the result that 1,527 ponds and 410 dams have been rendered serviceable once more. Since the fiscal year 1919 the policy of making the local revenues bear the burden of restoring them has been pursued.

In 1920 the government-general drew up a program to be executed in 15 years from that year, and is now actually at work on it. This program aims at the improvement of one-half of the total area of uncultivated lands amounting to 800,000 *chobu*, as well as of paddy-fields and lands capable of being turned into paddy-fields.

Undertakings for irrigation appeal to the common interest of

agriculturists and visibly illustrate the convenience afforded by water-utilization associations, so the government-general is encouraging their formation, while it also recognizes private undertakings. Since undertakings of this kind affect people in various ways, however, the government-general has made it a rule that permission for such must first be obtained, and the number of permissions already granted is 74, affecting an area of over 8,200 *chobu*.

The New Pacific Building, Manila

THE new Pacific building at Manila is the property of the Pacific Building Company, the principal stockholders of which are the International Banking Corporation and the Pacific Commercial Company.

Occupying about 1,800 square metres of irregularly-shaped ground, it has a frontage of 140-ft. on calle General Luna and 150-ft. on Muelle de la Industria, along the Pasig river. With its five-story frontages relieved by majestic columns and the artistic details of the design standing out prominently, the building is a fine sight from any part of the Pasig river section.

In many respects the building is a model of modern building practice. Many features that have hitherto been unknown in Manila are incorporated in it. Take for instance the plastering on the walls. It had never been done before. There was no argument against it but that. The interior walls of the building are finished in fine, smooth, white plaster, just like in the United States. A prominent feature of the interior is the ceiling of the lower floor, which is to house the Bank. It is made of moulded plaster of Paris, manufactured right on the ground. The material had never before been employed for this purpose there and it was difficult at first to teach the workmen to make the moulds and attach the casts.

Light and air have been assured for all office space by the careful distribution of area and court spaces. The P. C. C. premises on the fourth and fifth floors are all open, undivided by partitions. One large room is being made into a sample room. It has glass sides and will afford a good display of goods at all times in natural light. To provide for dark, rainy days, an invisible lighting system is installed throughout. One of the most noteworthy features of the building is its sanitary and thoroughly equipped wash rooms and toilets. The plumbing throughout the building is open and easily

accessible. Mail chutes are on hand on each floor.

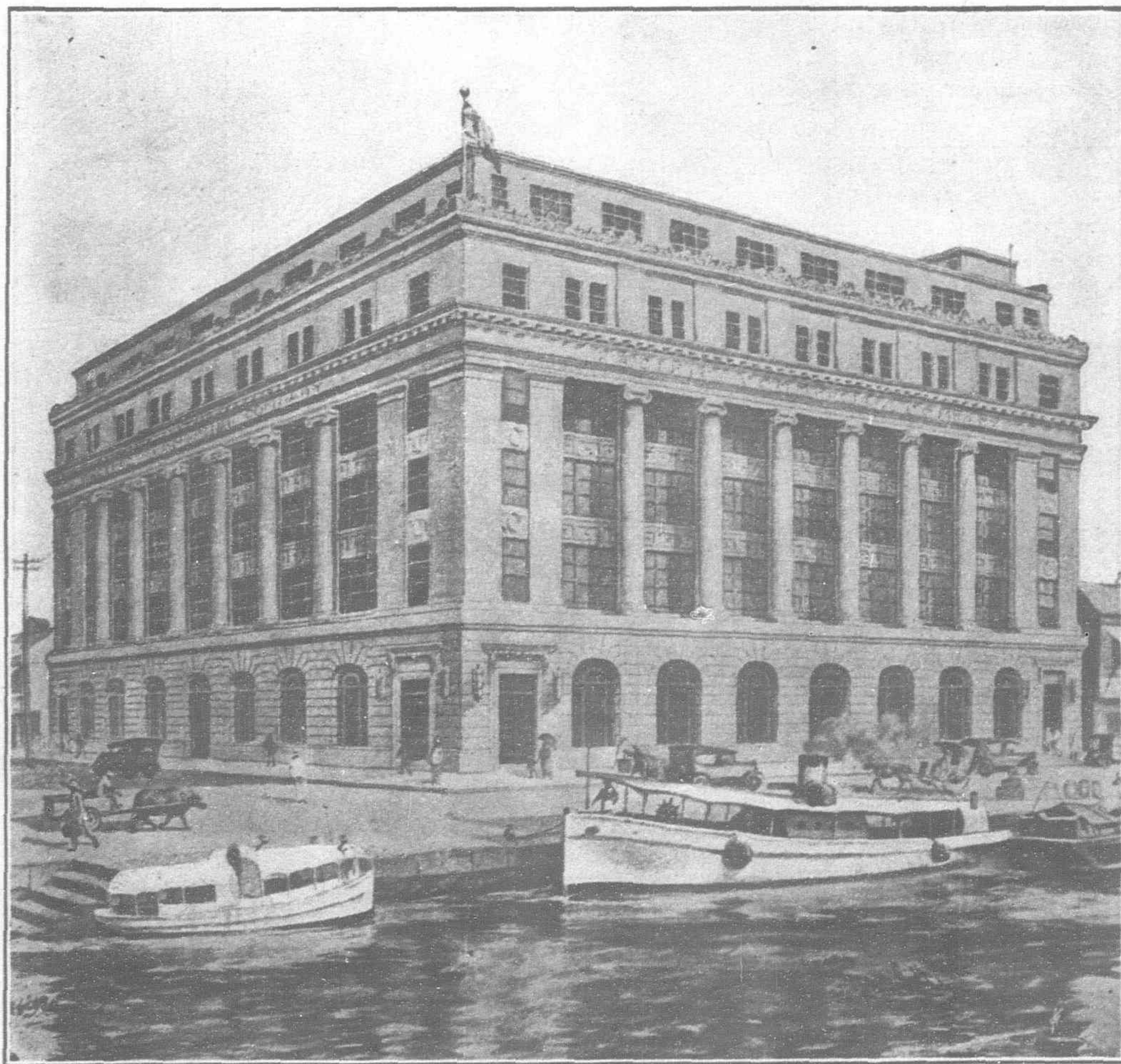
On the ground floor of the building is a pumping plant worked by compressed air which will carry the city water to the fifth and sixth floors, as the gravity system often does not reach beyond the fourth floor. This pumping installation can be used for the lower floors if needed.

Six elevators are provided for, but only four of most modern type have been installed. They are equipped with automatic safety doors, handsomely finished in bronze, which make it impossible to operate the cars until the doors are closed. This system is sure to prevent accidents. Two large shafts are used for freight hoists, consisting of blocks and tackle capable of lifting a ton at a time.

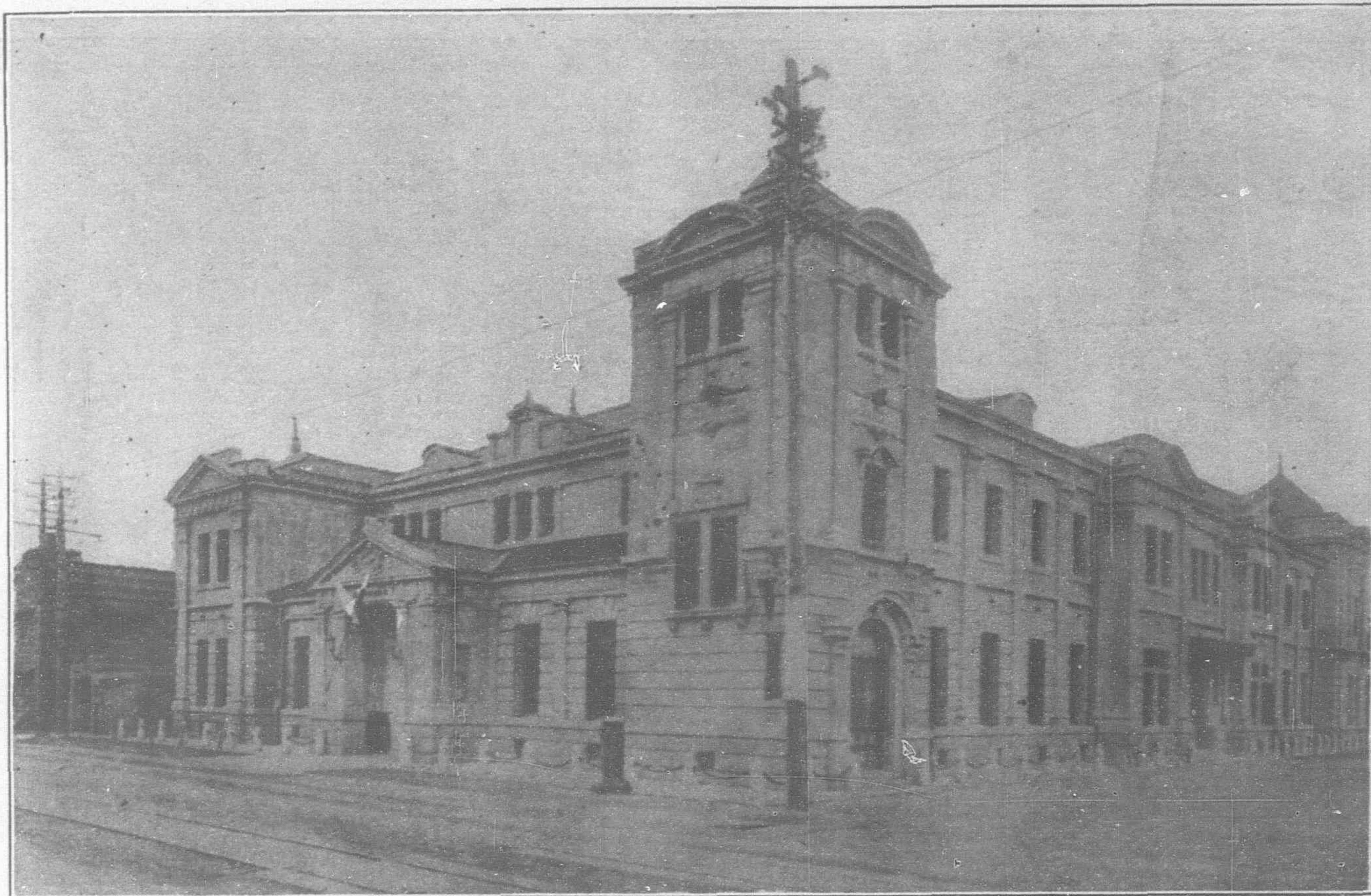
A special type of window sash has been installed throughout the building, eliminating much wooden construction and affording perfect ventilation and protection against the elements. All doors are of heavy native hardwood, brilliantly polished. The office of the general manager is entirely panelled in the best variety of Philippine hardwood. On the floors are laid thick battleship linoleum. A composition called durostone will be used to finish the ground floor walls. Marble is employed throughout the building for thresholds and ornamental slabs.

The International Banking Corporation quarters will be particularly handsome in finish and equipment, no expense having been spared in this respect. When completed, the Bank's premises will stand comparison with the finest at home or abroad.

Murphy, McGill and Hamlin, of New York and Shanghai, are the architects. They are represented on the ground by H. H. Keys. Oscar F. Campbell is the contractor and S. D. Rowlands, the structural engineer. The cost of the building alone, without the land, is P.2,000,000.



The New Pacific Building at Manila. Murphy, McGill and Hamlin, Architects



Head Office of the Hokkaido Colonial Bank at Sapporo

Industry in the Hokkaido

THE 1921 report on industrial conditions in the Hokkaido show that the total value of all products that year amounted to more than Y.150,000,000. In 1914 their value was only Y.28,700,000. The increase in value of industrial products is far greater than the increase in the value of agricultural products for which the Hokkaido is principally noted. The great industrial progress is due to the plentiful supply of raw materials from land and sea, combined with a cheap and plentiful supply of coal.

The principal industry in the Hokkaido is the manufacture of foreign and Japanese paper. The leading foreign paper mills are the Ikeda Mill of the Oji Paper Manufacturing Co., and the Ebetsu, Kanayama and Kushiro mills of the Fuji Paper Mill Co. The principal manufacturers of Japanese papers are the Kita Nihon Paper Manufacturing Co., Ltd., the Hokkai Paper Manufacturing Co., Ltd., and the Hakodate Paper Manufacturing Co., a limited partnership. The Oji and Fuji companies produce principally newsprint, supplying more than 85 per cent. of the total demand in all Japan. Their last year's production amounted to more than 200,000,000 pounds, valued at about Y.20,000,000.

The production of the Japanese paper manufacturers does not fill the demand for such paper in the Hokkaido alone. What they do not supply is imported from the northern prefectures of Japan proper. The great progress in the manufacture of foreign paper and pulp in the Hokkaido is due to the great supplies of timber and coal, and abundant hydro-electric power.

Next to paper in order of importance come fertilizers, sugar, oak bark tanning, fish and vegetable oils.

Superphosphates are manufactured in the Hokkaido and ammonium sulphate is produced from atmospheric nitrogen. Superphosphates are manufactured by the Dai Nihon Jinzo Hiryo K.K. (Dai Nihon Artificial Fertilizer Co., Ltd.), Hakodate Factory, and the ammonium sulphate is produced at the Tomakomai factory of the Denki Kagaku Kogyo K.K. (Electro-Chemical Industrial

Co., Ltd.) The total production of fertilizers in 1921 was 1,500,000 *kwan* (8.28-lb.), valued at Y.4,000,000. Before the war at the end of 1914, only half of this amount of fertilizer was manufactured, valued at less than Y.800,000.

Beet Sugar Industry

Many years ago beet sugar raising was begun in the Hokkaido, but it proved unsuccessful. In 1919, however, two companies were organized to plant sugar beets and extract sugar. The Hokkaido Beet Sugar Co., Ltd., capitalized at Y.10,000,000 has a factory at Obihiro, and the Nihon Beet Sugar Manufacturing Co., Ltd., owns a factory at Shimuzu, but because of financial difficulties business has not been very prosperous these past two years, but with the revival of good conditions an increasing acreage is being planted to beets every year. The future of this industry is very promising.

Oak Bark Tanning

The Nihon Hikaku K.K. (Nihon Leather Co., Ltd.) has a tanning factory at Ikeda, and the Nitta Obikawa Seizosho (Nitta Leather Belt Manufacturing Co.) operates one at Tokachi. There is a plentiful supply of oak bark in the Hokkaido, and the industry is not an unpromising one despite present difficulties, caused by over-extension during the war.

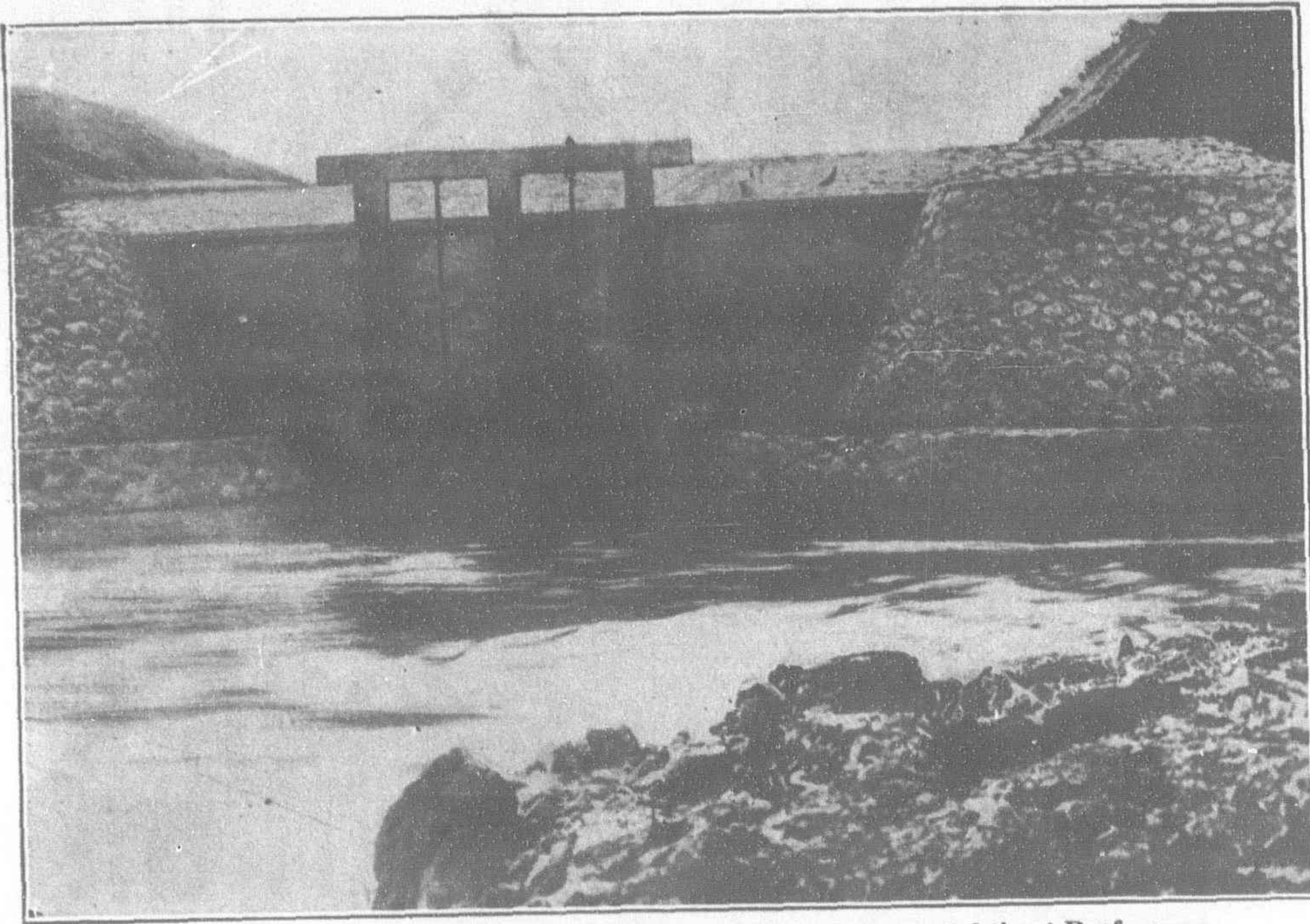
Fish Oil Manufacture

The principal oils pressed in the Hokkaido are codfish, cod liver, whale, and rape seed oil.

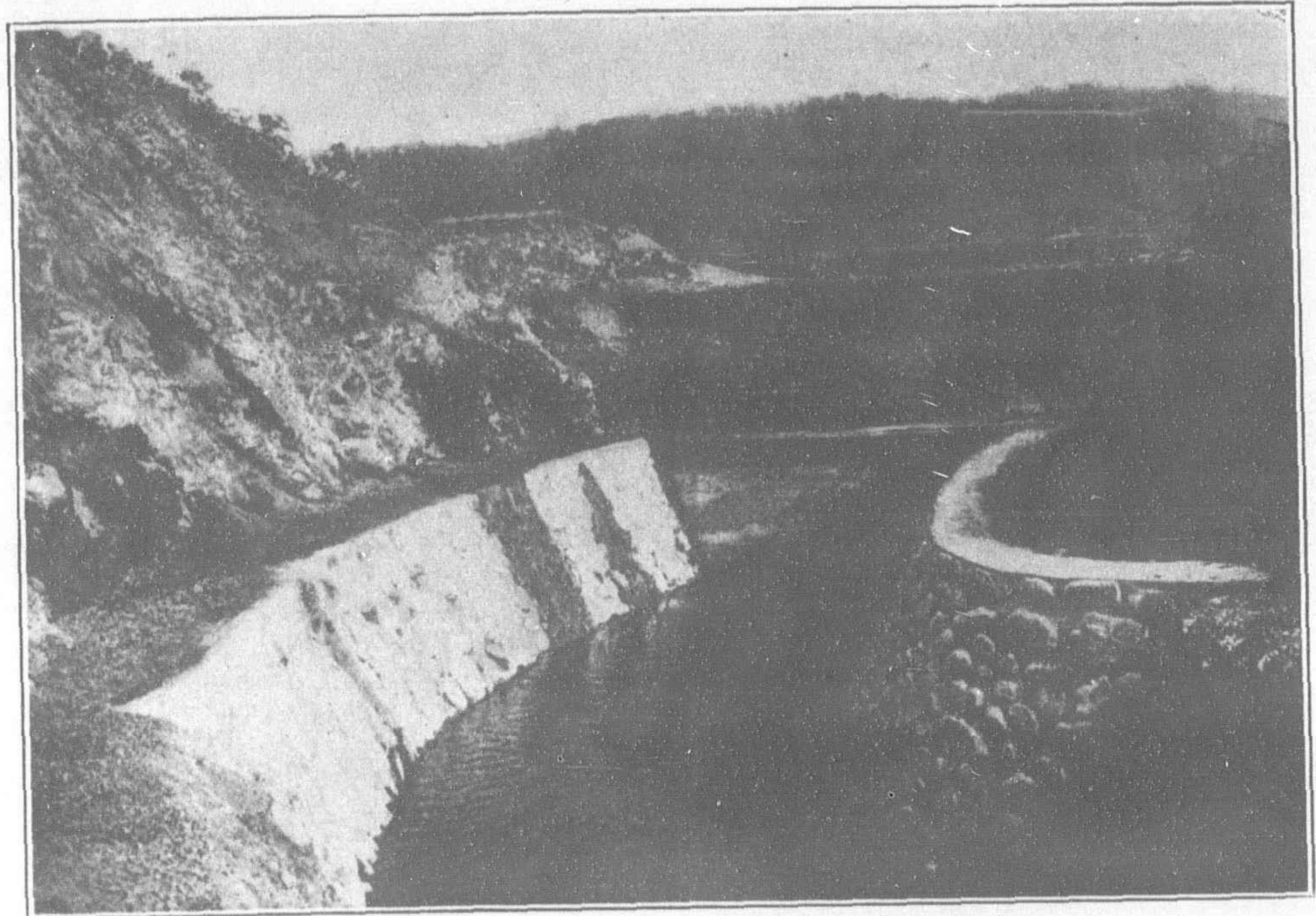
The larger part of the oil extracted is shipped to Japan in its crude state for refining. In 1914, the production of fish oil was valued at Y.370,000. It had not increased to any great extent by the end of 1920, when it was worth only Y.380,000. The output of whale oil in 1914 was valued at Y.110,000, but in 1920 it had fallen to only Y.45,000.

HOW JAPAN IS DEVELOPING THE HOKKAIDO

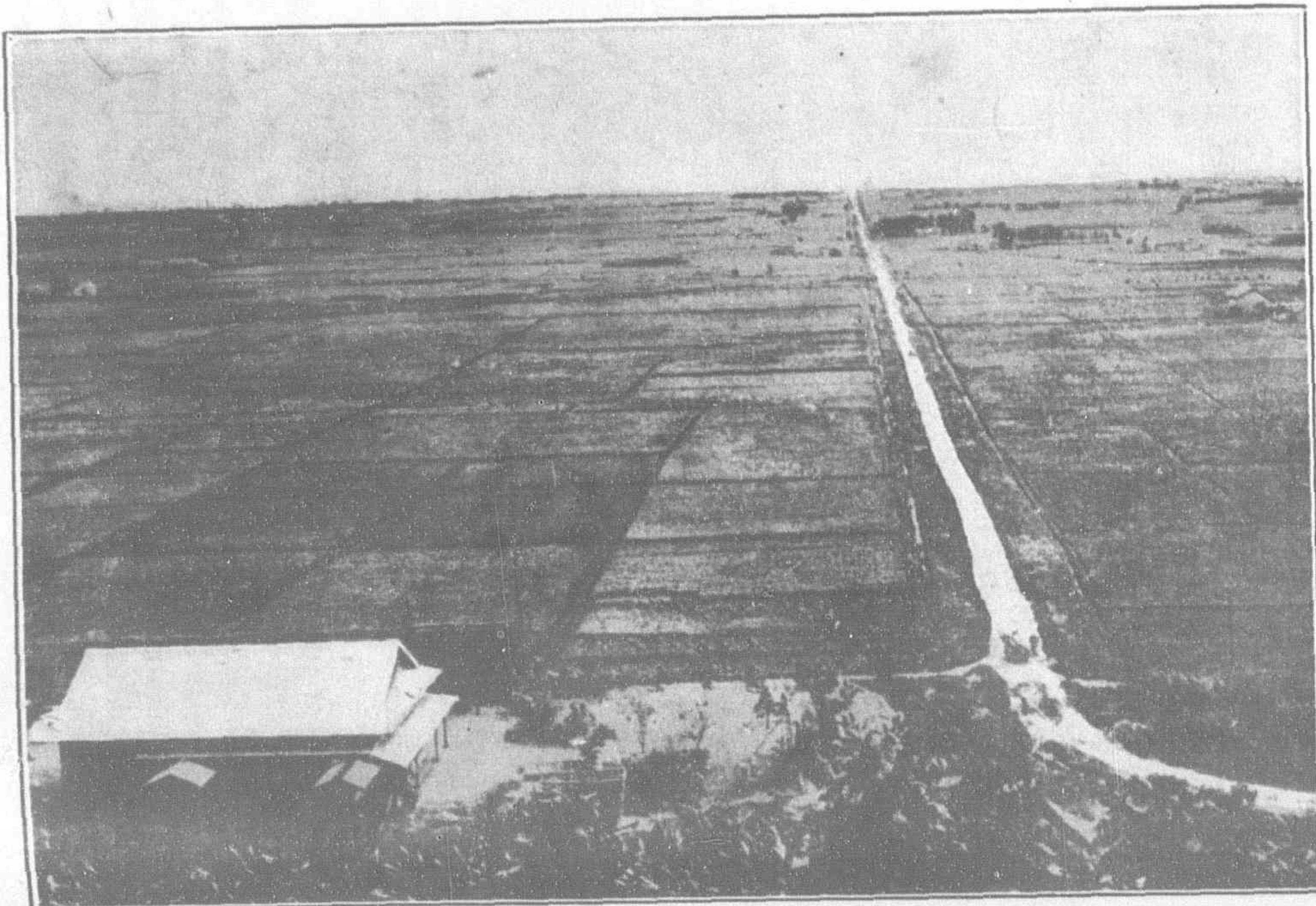
VIEWS OF THE IRRIGATION SYSTEM



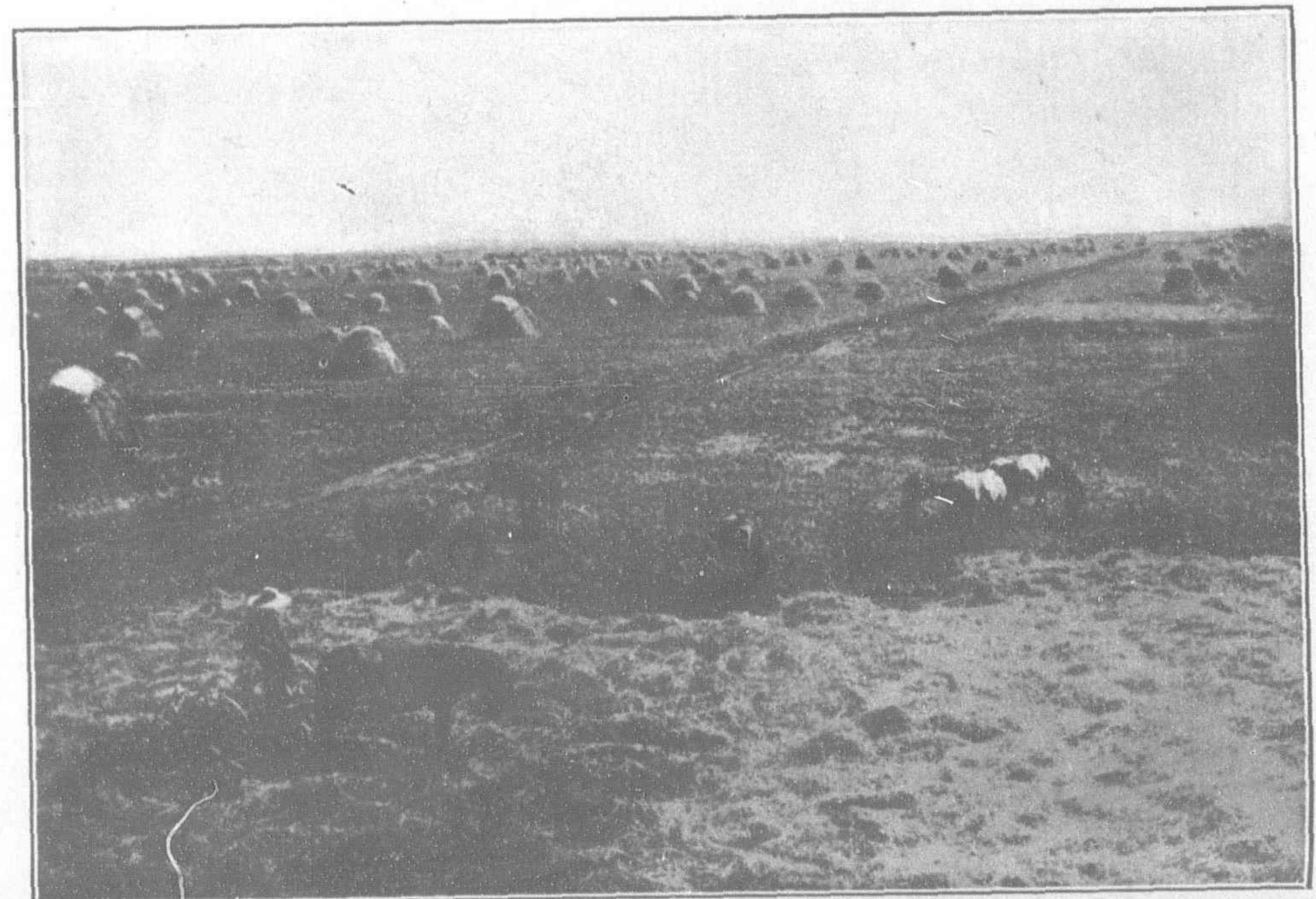
Sluice Gate of the Hokuryu Doko Guild at Hokuryu Mura, Ishikari Prefecture



Irrigating Canal of the Hokuryu Guild



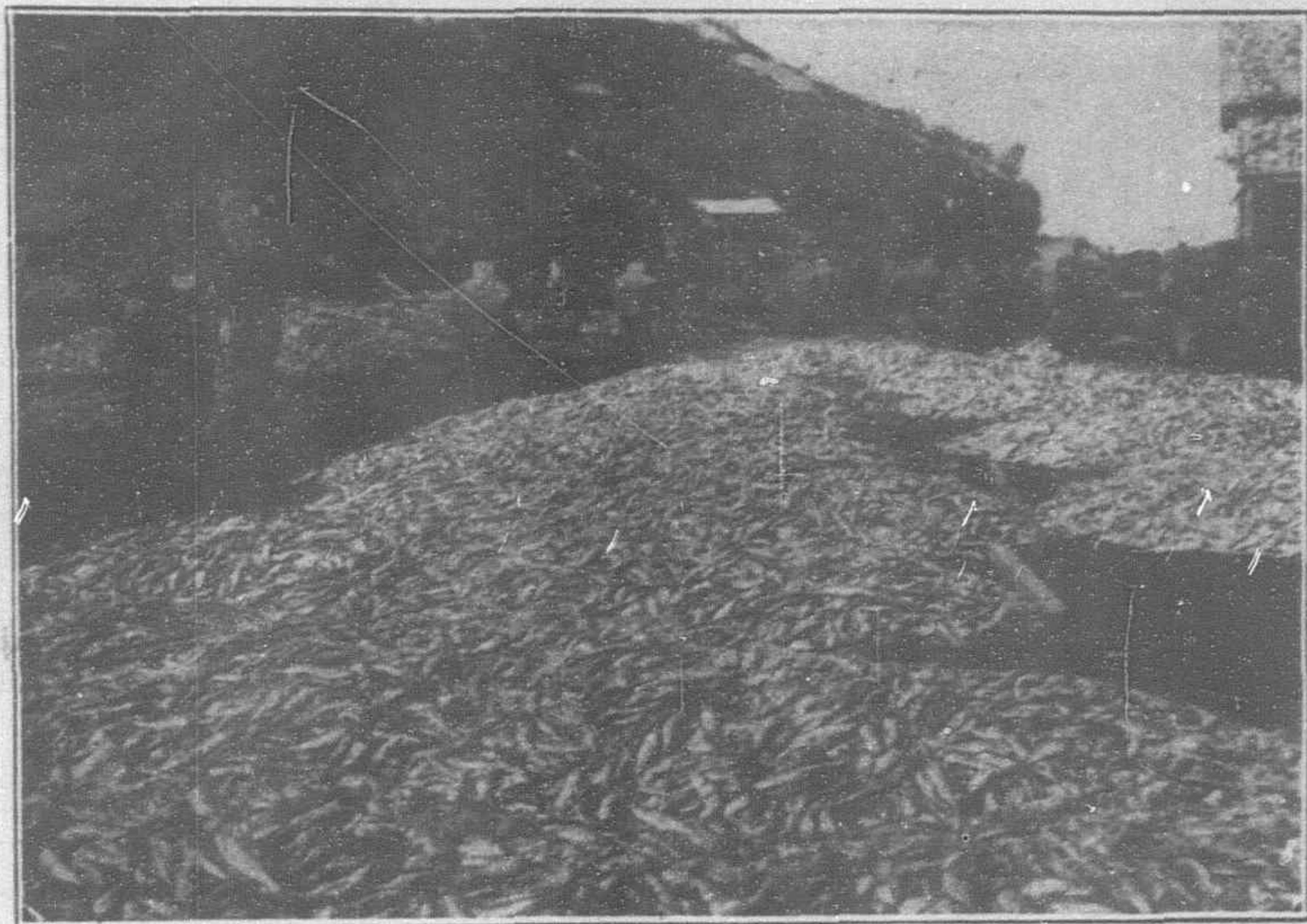
Irrigated Farm Land in Magayama-Mura, Ishikari Prefecture



The Crop from an Irrigated Alfalfa Field, near Sapporo



HOKKAIDO IS THE CENTRE OF A GREAT FISHING INDUSTRY
The Herring Catch at Yoichi, Shiribeshi Prefecture



Catch of Herrings at Oshoro, Shiribeshi, Prefecture

The Hokkaido has an extensive coast line, 1,355 nautical miles, and the supplies of fish along its sea-coast are almost inexhaustible. The reason the industry has made but little advance in these past eight years is because it is not carried on in a large way. There is a great future for a company organized to press oil on a large scale with modern machinery.

Besides these industries, there are cement, brick, glass, earthenware, pottery, shipbuilding, iron works, and other enterprises in the Hokkaido. Hemp spinning and rope manufacture has increased, and the breweries, flour mills and canning companies are making favorable progress. Industry in the Hokkaido is prosperous because its products are supplied principally to the local markets, where the demand is greater than the local manufactures can supply. There is much room for expansion of industry, especially as the resources of the Hokkaido have hardly been scratched.

Marine Transportation

Marine communication from port to port in the Hokkaido and between the Hokkaido and the main island of Japan is carried on by the Kurabayashi Shosen K.K., the Kita Nihon Kisen K.K. and the Nippon Yusen Kaisha. Since the domestic and foreign departments of the N.Y.K. have become independent of one another, great attention has been paid to the development of periodical services in the coasting trade, especially in the Hokkaido. The N.Y.K. operates the following lines to the Hokkaido and north:—

Hakodate to Karafuto, in summer only	88 trips a season.
Otaru to Karafuto, in winter only	.. 20 .. "
Hakodate-Abashiri-Kurile Islands	.. 76 .. "
Kobe-Kushiro	.. 18 .. "
Yokohama-Karafuto	.. 14 .. "

Twelve of company's fleet are operated on these routes, in addition to several chartered vessels of 1,500 to 3,200 tons.

A new passenger steamer was recently built for the company, called the *Chitose Maru* of 2,670 tons. It is furnished with wireless and ice breakers. Special attention has been paid to accommodation for third-class passengers.

Until a few years ago steamers in the Hokkaido service were of less than 1,000 tons, but the growing business induced the N.Y.K. to build and operate a better type of vessel. The future of this transportation is very promising.

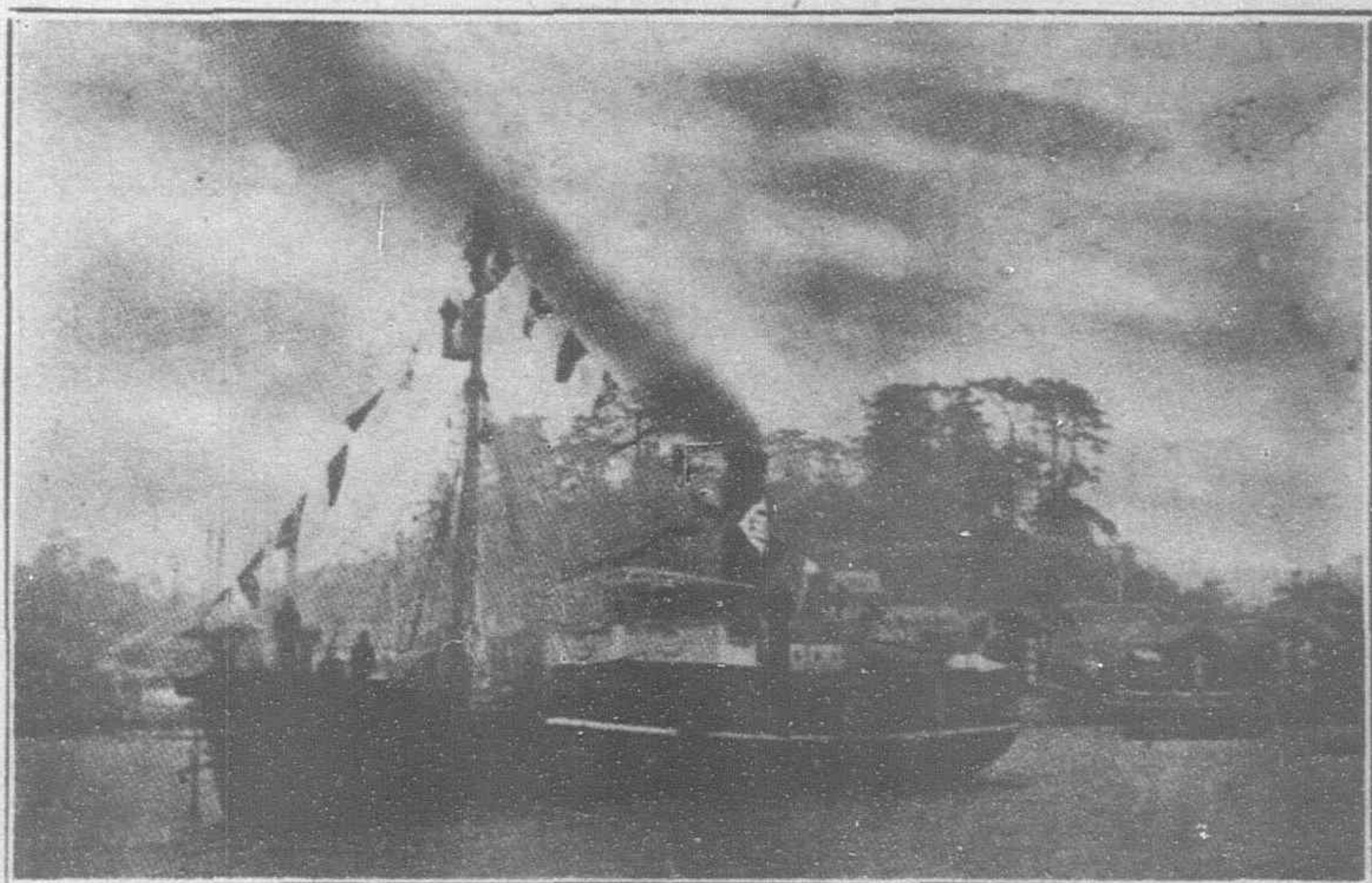
Kamchatka is not only a very profitable field of business for the canning industry, but lumber, petroleum and gold are expected to add to the wealth of this region. Lack of proper communication has kept Japanese capital from developing these resources, but with the extension of regular steamship services during the summer season, Kamchatka is expected to develop rapidly.

The Kuribayashi Commercial Steamship Co., Ltd., operating about 140,000 tons of vessels, with Muroran as the centre of its

activities, engages in regular or occasional services to Saghalien, Nikolaevsk, Vladivostok, North and South China ports, the Yangtze river and Chosen. The company was established in April, 1919, taking over the shipping department of the Kuribayashi Gomei Kaisha. It is capitalized at Y.2,000,000, all paid up. Its main office is No. 1 Minami Nabe Cho, Kyobashi Ku, Tokyo, with branches at Muroran, Kushiro, Hakodate, Otaru, Yokohama, Osaka, Moji, Tsingtau and Shanghai. The fleet owned by this company consists of 11 steamships, aggregating 25,568 tons.

Besides these steamers it operates the *Hidaka Maru*, of 5,500 tons, chartered from the government. In September, 1919, this company had under charter 72 vessels of more than 148,200 tons. In March, 1920, it had only 48 vessels, tonnage 80,830. In May, 1921 only 25 vessels were chartered with a total tonnage of 52,000. But in June 1922, there was an increase in the number of vessels to 42, and in tonnage to 110,400 tons. The chartered vessels are used in freight transportation only. At present this company is operating 54 vessels of 142,400 tons.

The principal cargo is fish. With the opening of the fishing grounds in Kamchatka, the Kuribayashi Shosen Co. engages in the transportation of materials for the canneries, and the canned fish back to Japan and to China, from the early spring to the closing of the ice pack. About 70 per cent. of the total freight traffic of this company is carried in connection with the operations of the fishing companies in Kamchatka. During the fishing season the tonnage operated rises to more than 150,000 tons. The irregular services of this company cover practically the entire Far East. Its greatest endeavors are made to increase the shipment of marine products, and lumber to the Chinese markets from the Hokkaido.



A Steam Whaler of the Toyo Hogei Company operating in Hokkaido Waters

Railways in the Hokkaido

HOKKAIDO, the northern most island of the Japanese main group, is the principal undeveloped agricultural district belonging to the nation. Development, despite rapid progress, has been handicapped by lack of means of communication. Roads are still primitive and insufficient for a growing community and the rivers can be used only for the transportation of timber rafts, the principal wealth of Hokkaido to-day.

The leading products of the Hokkaido, timber and coal, are of such a nature that their successful development depends largely upon railway communication. Because of the lack of organs of communication the inhabitants of the Hokkaido are still obliged to obtain the greater part of their rice and salt from Japan proper, selling in exchange their crops of miscellaneous cereals. Consequently, the shifting of cargo has become greater and greater every year necessitating the extension of existing railway lines and showing very plainly the need of new ones.

Conditions of communication being such as they are colonists are unwilling to settle in remote places and the agricultural and industrial development in general is retarded more and more every year.

In the past whenever it was announced that any particular part of the Hokkaido would be tapped by a railway line the price of land, and land for agricultural purposes, forests and mountainous districts even, would rise by leaps and bounds, as settlers have always been attracted where there is easy means of communication.

The needs of the Hokkaido have long been recognized and compared with other parts of Japan a rapid rise in progress in the construction of railways has been notable during the past five years. Something like sixty to seventy miles of new railway are constructed annually, and along with their operation the most remarkable developments of industry in the Hokkaido have taken place.

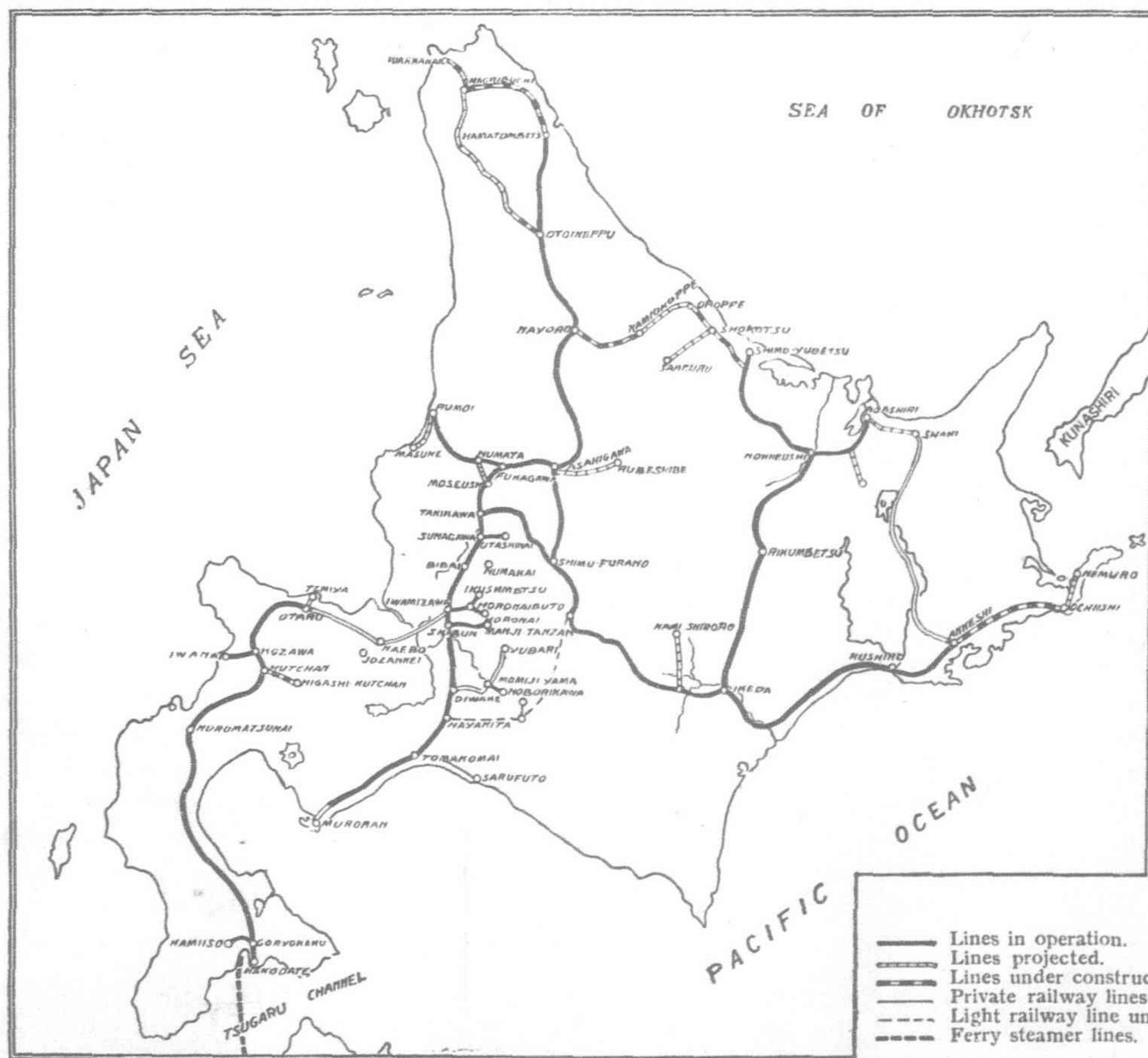
To-day the imperial government railways operates 1,200 miles of lines in the Hokkaido. These are the trunk lines which connect the north with the south and the east with the west. In all Japan, including the Hokkaido, the imperial government railways operates 6,300 miles, so that the undeveloped Hokkaido alone contains one-fifth of all Japan's official railway mileage. There are five private railways, including light railways, in the Hokkaido which operate sixty-four miles of line.

The imperial government railways project the construction of the following lines during the next six years, viz. :—

Names	Distance	Projected date of completion
Soya Line ...	Kishibetsu—Wakanai	1922 do.
Rubeshibu...	Shin Asahigawa—Rubeshibe	1923 „
Shokotsu ...	Shokotsu—Sakkuru	„ „
Teshio ...	Otoishifu—Kabaoka	1924 „
Aioi ...	Bihoro—Aioi	„ „
Kamishihoro	Obihiro—Joshihoro	„ „
Kushiami ...	Kushiro—Abashiri	1926 „
Chorin ...	Nagamabe—Wanishi	„ „
Hahoro ...	Rumoe—Hahoro	1928 „
Uryu ...	Fukagawa—Uryu	„ „
Engaru ...	Rubeshibe—Engaru	„ „
Setana ...	Kuninui—Setana	„ „
Hyocha ...	Hyocha—Hishikawa	„ „

With the opening of the Soya line, the communication between this island and Karafuto will be shortened considerably.

The railway department also plans to improve the lines now in operation and the first of this work will be the double tracking of the Muroran-Oiwake line. After this line is completed the distance between Iwamizawa and Takigawa will also be double-tracked. The principal improvement that the department desires to make, however, is that in the connection between Hakodate in the Hokkaido and Aomori, the terminus of the main line be-

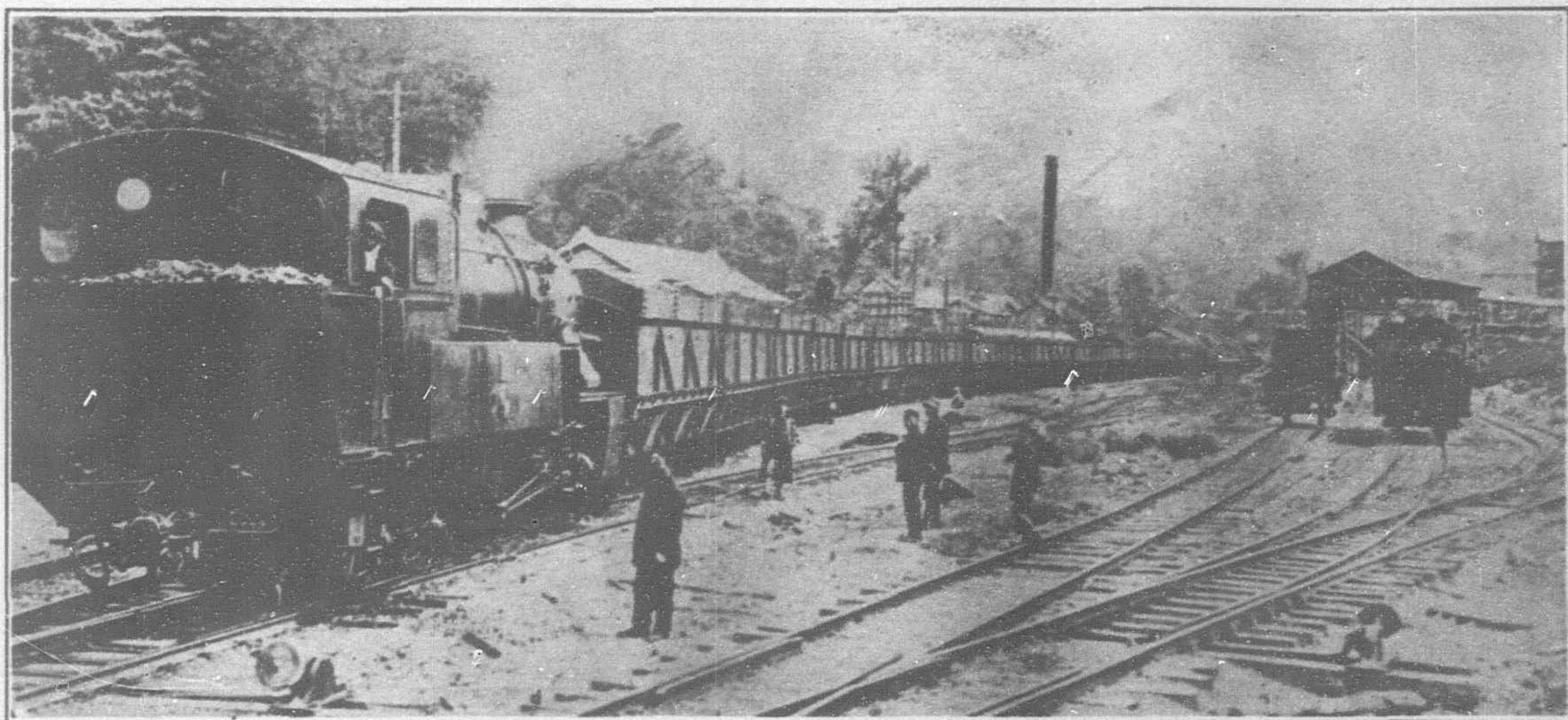


tween Tokyo and the north on the main island. Between the two ports in the past it has been necessary to transfer all passengers and all freight either port. The improvement planned consists in the operation of four ferry boats on which both passenger and freight trains can be transported across the straits. Two of these ferry boats have been ordered, and it is announced that they will soon be completed and put in operation.

One of the great industries in the Hokkaido is fishing, and the supplies of fresh fish on the main island are always below demand. In order to transport fresh fish from the Hokkaido to the district around Tokyo, the railway department has placed an order for many refrigerator cars, something which has not yet been seen in Japan. One thousand five hundred freight cars are also under construction for use in the transportation of timber only.

Bibai Coal Mine Station of the Bibai Railway in the Hokkaido

The Locomotive drawing 80 loaded Coal Cars was made at the Kobe Works of the Mitsubishi Zosen Kaisha, Ltd.



From the point of view of passenger traffic, the Hokkaido is rich in beautiful scenery and there are many famous hot springs which attract visitors at all times of the year.

Private Railways

There are five private railways in the Hokkaido, the Bibai, Tomakomai, Jozankei, Noboribetsu and Sutsu railways. The Hokkaido Kogyo Tetsudo Kabushiki Kaisha (The Hokkaido Mining and Railway Company, Limited) will shortly open a new line. The government of the Hokkaido recently granted a subsidy of seven per cent. of the paid-up capital of all private concerns which would undertake railway operation on that island. It is expected that this assistance will materially expedite the construction of railways.

Bibai Railway

The Bibai railway runs from Bibai station on the imperial government line to the Bibai coal mine, a distance of five and one-tenth miles. Although the line is comparatively short, it shows the best business results of any of the private companies in the Hokkaido, due largely to the Mitsubishi Bibai coal mine which annually ships from five hundred thousand to six hundred thousand tons of coal over the railway. The mine is planning to greatly increase its production.

The immense Bibai coal deposit, purchased by the Mitsubishi Mining Company in 1920 from Mr. Entaro Iide, is of an exceedingly good quality. Its present output of six hundred thousand tons is to be increased to a million tons a year. The vertical shafts now being bored will be completed by 1926 and the railway company is preparing to take care of the increased volume of freight.

The standard grade of the railway is $\frac{1}{47}$. Heavy grades are laid with 75-lb. rails with 60-lb. rails on the level. The freight cars are of 24 to 30 tons capacity. There are very few passengers and most of these are miners and the members of their families. The

average daily number of passengers is about three hundred. When the mine was at the height of its prosperity in 1920, more than 600 passengers were carried every day.

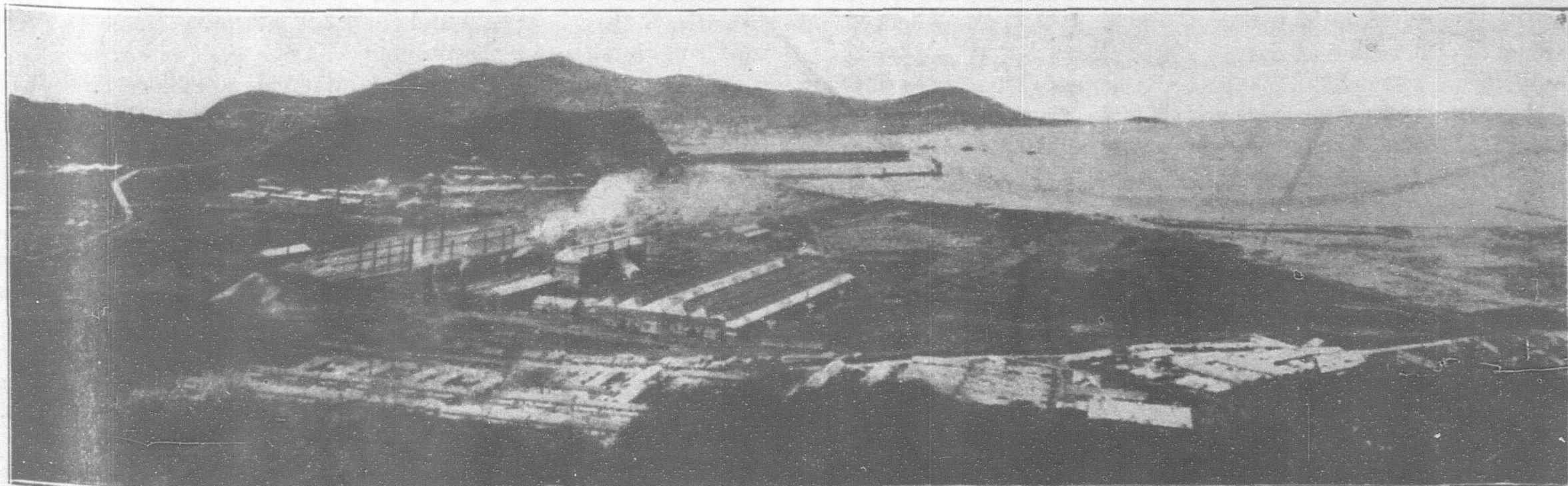
The Bibai Railway Company owns two super-heated freight locomotives and four passenger locomotives of less powerful type.

The railway is closely connected with the Bibai Coal Mine Company being managed by the Mitsubishi. Mr. Ichini Mitani of the Mitsubishi Mining Company, Limited, and Mr. Kame Saburo Ikade, the president of the Bibai mine, are members of the board of directors, but the actual management of the company is in the hands of Mr. Ryoichi Mori, at one time an official of the railway department, who entered the Mitsubishi in 1917, receiving his appointment as manager of the Bibai mine in 1918.

With a capital of Y.1,200,000 paid up, the company has been paying eight to nine per cent. each business term. At the same time Y.60,000 a term has been put in a special reserve for decreasing capital, so that at the end of twenty years the total capital will have been returned.

Sutsu Railway

The Sutsu Railway Company operates a line from the Kuro-matsu station of the Hokkaido government main railway to Sutsu-machi, a distance of ten and a half miles. Sutsu-port, the terminal, an important centre of communication by land and sea for several hundred years, is rich in marine products and at one time was very prosperous. When the main railway connecting Otaru and Hakodate was completed, Sutsu was left ten miles away. Frequent appeals were made to the government which declined to build a branch line, so it became necessary to build a private railway in order to keep the town alive. With the help of capital, in Hakodate, the Sutsu Railway Company, Limited, was organized. The license to construct a railway was granted in February, 1918, and in August 1918, the company was organized with a capital of



The Japan Steel Works at Muroran, in the Hokkaido

Y.500,000, which has since been fully paid up. The officers of the company are :—

President and Director, Hejiro Sasaki ; Managing Director, K. Hata ; Directors : T. Sakai, E. Hyodo, J. Tsuchiya, K. Inukami and C. Nakada ; Auditors, Z. Tachikawa and T. Umemura ; Advisors, H. Narazaki and K. Okada.

The right of way was purchased and construction commenced in the spring of 1919, and in October, 1920 the line was open to business. Its cost of construction was approximately Y.900,000.

The opening of the line has greatly stimulated business, especially the transportation of fish. There are large farms and rich agricultural and mining districts in the district served by the Sutsu railway. The bay of Sutsu, a fishing as well as a commercial port, is the only sheltered harbor between Hokodate and Otaru. The authorities are now planning harbor improvements, which will again make Sutsu an important marine transportation centre.

The cost of the construction of the railway line exceeded the capital of the company by more than Y.400,000. This difference was met by a loan from the Hypothec Bank of Japan, at a very reasonable rate of interest.

Jozankei Railway

The Jozankei Onsen K.K. owns the famous hot springs of Jozankei, which failed to attract visitors because of the inconvenience of reaching it. Residents of the town therefore organized a railway company and a line completed in October of 1918, from Shiraishi station on the Hokkaido government railway's main line to Jozankei, passing through Toyohira, a distance of 18½ miles. Since its opening, passenger traffic has increased by ten per cent. each business term and in proportionate manner the general business condition of the company has also improved.

The imperial timber preserves, situated in this railway zone, ship a large amount of lumber. Building stone is also shipped from the Ishikiri mountains. The Hou silver mine belonging to the Kuhara Company is also situated in the railway zone. The future of this line is, therefore, very bright.

The company is capitalized at Y.800,000 fully paid up. Its officers are : President, Motosaburo Kaneko ; Managing Director, Kinzo Oshima ; Directors, O. Kawamura and Y. Nakanishi ; Auditors, Y. Ishida, S. Yoshioka and K. Yamamoto ; Manager, G. Tachibana.

Tomakomai Keiben Tetsudo Kabushiki Kaisha

This railway, operated by the Oji Paper Manufacturing Company, Limited, is the longest private railway in the Hokkaido, running from Tomakomai to Saruta, a distance of 25.1 miles. It was originally constructed to transport the timber necessary for the Oji paper mills. In recent years, however, other freight has been developed and passenger traffic has increased so that the railway has become an extremely prosperous one.

The principal freight is timber, sent down from the logging district of the upper Saryu River, and landed at Saruta, where it is loaded on the cars for transportation to the Tomakomai mill of the Oji Paper Manufacturing Company. A large amount of charcoal is also loaded at Saruta and Mukawa.

With a capital of Y.500,000, the company has been making a half-yearly profit of more than Y.37,000. During the last term of 1921, the income from passengers amounted to Y.42,400, from freight, Y.158,000, of which Y.56,000 was paid by the Oji Paper Manufacturing Company.

This railway is the only means of communication with the Hitaka district. A number of branches are being planned to connect with this line. One of the schemes is a new company, to be called the Saru Tramway Company, Limited, capitalized at Y.150,000, to build a branch line of eight miles from Saruta to Hiratori, on the Saryu river. This was licensed to begin business during June. Later on, this line is to be extended 19 miles to tap a large limestone and coal deposit in the interior. It is also reported that the Nissho railway which will connect Saruta and Urakawa of Hitaka province, where there is a branch office of the Hokkaido

government, plans to make the Tomakomai Light Railway Company the basis of its line. The Nissho railway, recently licensed, will have 50 miles of line and construction work will be begun in the very near future. When this new railway is completed the Tomakomai railway should be swamped with freights which will be sent from the virgin soil of Hitaka province.

Hokkaido Mining & Railway Company, Limited

A new railway enterprise called the Hokkaido Mining and Railway Co., was licensed in July, 1918, to build a railway from Numanohata to Kanayama, and from Sapporo to Numanohata, with several branch lines, totaling in all 131 miles of new railway. The plan is to build lines which connect with the government railway main lines, especially the line to Muroran, and to extend branches into the great coal fields along the main lines. The authorized capital of this company is Y.10,000,000, of which one-fourth will be paid up by August this year.

Construction was begun in May 1920, despite the adverse conditions of the financial and industrial world, and a part of the projected line as completed and opened to business on July 24.

The section between the terminal at Numanohata and Ikubetsu, a distance of 22 miles was opened on July 24. Between these two places there are only two stations Kami Mukawa, and Kami Azuma. The steepest grade is $\frac{1}{80}$, and the gauge is the same as the government lines, 3-ft. 6-in. A sixty-pound rail is used, and will be used on all the lines, except in the places where traffic will be heaviest when a 75-lb. rail will be used.

During 1922 a section between Ikubetsu and Hetonai, some 20 miles, will also be opened. During 1922, therefore, more than 42 miles will be completed, at a cost of Y.3,000,000, it is estimated.

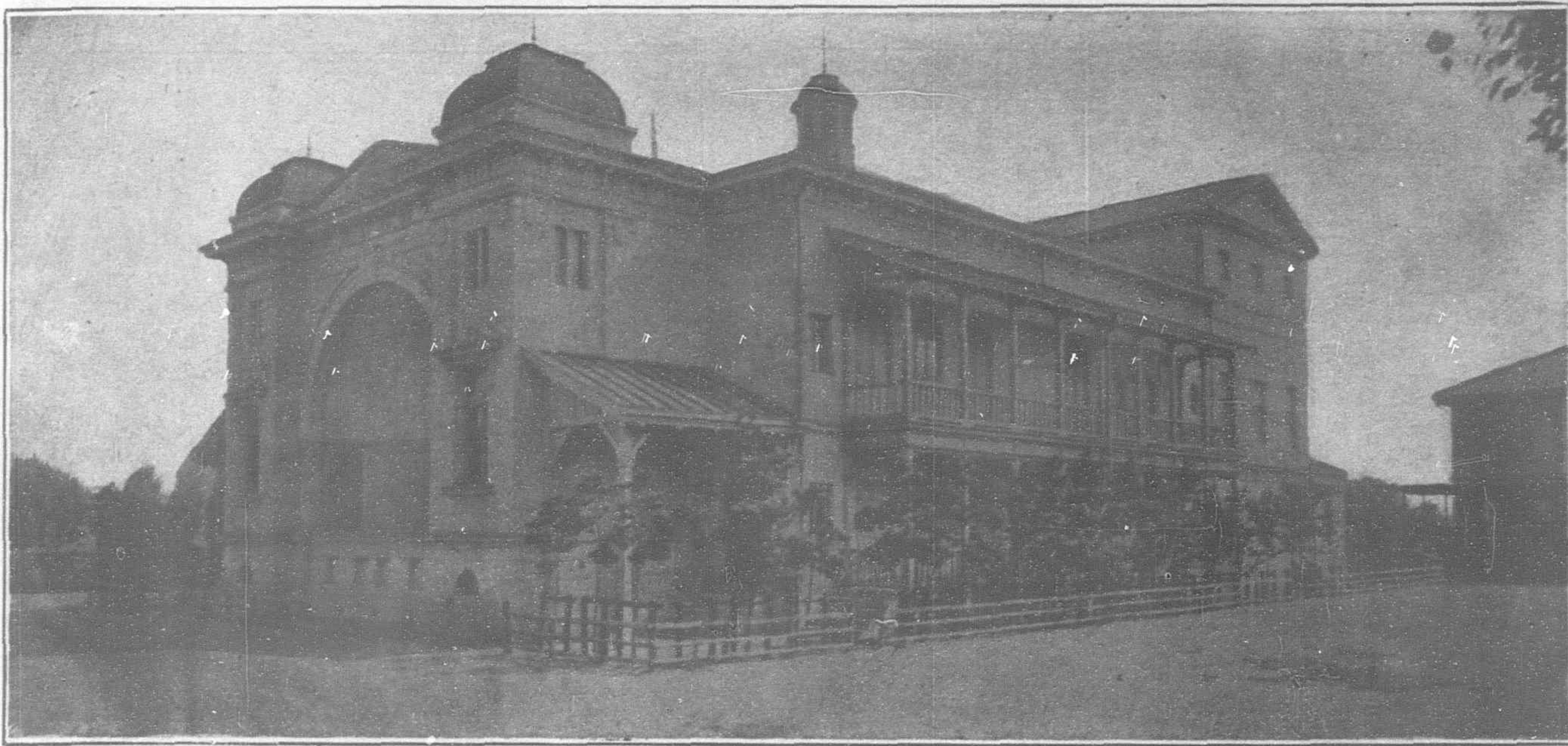
As soon as this section to Hetonai is completed work on the Numanohata-Kanayama line will be abandoned for the time and the Sapporo-Numanohata line will be begun at once. Between Numanohata and Sapporo the line will be 36 miles, and the branch line between Chitose and Oiwake will be ten miles long. The line is most anxiously awaited by the inhabitants in the zone of the projected railway, and the land for the right of way has already been acquired, largely by free gift of the delighted colonists. The actual work of construction will be begun very shortly, and when the line is opened to business a distance of some 30 miles in direct travel will be saved. The government line now in operation, which reaches both Sapporo and Numanohata covers 64 miles, the Hokkaido Kogyo Tetsudo line will be only 36 miles. The projected private line will form the base of the triangle made by the government lines from Sapporo.

The construction of the line between Hetonai and Kanayama will be more difficult than that of any other part of the projected railway lines. It is now being suggested that Kanayama be abandoned as the terminal and Ochiai substituted instead. In any case this line will connect the government Kushiro-Hakodate line with the government Muroran main line. The estimated distance of the future extension is forty miles, besides the branch line from Hobetsu to Naka Hobetsu, some five miles. The Naka Hobetsu district is near the Yubari coal field and there are enormous resources of coal and iron ore there for the tapping.

This railway company was planned to exploit the virgin mines of coal and iron along the railway zone. In the district covered by this company's lines the River Mukawa, one of the six large rivers of the Hokkaido flows. There are many forests along this river, as yet untouched with the axe, and there are agricultural villages which have no communication with the outside world. The village folk all along the different lines are most enthusiastic about the lines, and are giving all the help in their power to make the project a success.

The future of this railway company seems very promising. It has attracted a great deal of attention by touching several very rich undeveloped districts of the Hokkaido, and deserves well of the public for its plans.

The Hokkaido government allows a subsidy of 8 per cent. to this company.



Recreation Hall for the Mill Workers Employed by the Kanegafuchi Spinning Company, Ltd.

Ideal Industrialism in Japan

By Laurence Impey

IT has so happened that I have often found myself unsympathetic towards certain of the tendencies of modern Japanese life, which have appeared to me to be far too largely colored by the influence of the comparatively small political and militaristic cabal.

As, therefore, I am convinced of the innate kindness of the Japanese people as a whole, it is with the more pleasure that I put on record the favorable impressions I received during my visit to the factories of Messrs. Kanegafuchi, Ltd., which I would like the reader to appreciate with me, more particularly if he or she be interested in the economic conditions of the present day and the amelioration thereof.

I was greeted on my arrival by Mr. Tawada, the manager, to whose courtesy I am indebted for the information embodied herein, and who spent three hours in showing me one of the model factories of Japan, one indeed which rivals, in my opinion, any of the factories of the world.

My first visit was to the dining rooms, where the employees were having their midday meal, the time being eleven o'clock, when the whole factory halts for forty minutes' rest.

This may seem a short period to those accustomed to western trade unionism, but the eight or ten-hour day seems to be satisfactory to the Japanese worker up to the present, and I cannot say that I observed any signs of overstrain in the four thousand hands amongst whom I went.

The food in the dining rooms is prepared in the Company's kitchens, which I can certify are spotlessly clean, and as far as a few months acquaintance with Japanese food had made me any judge I should say it was of excellent quality, as it certainly was in quantity.

The cost to the employees amounts to ten cents per day for females and fifteen cents for men, which is well under cost, so much so that the Company last year had to meet a deficit of over £100,000, a figure which sounds surprising, but which the manager assured me was well worth while in its resultant increased efficiency and well-being of the work people.

We passed directly from the dining rooms into the general store, where the employees can purchase various articles of food, dry goods, and household necessities at cost price, a service which

is certainly fully appreciated by the workpeople, for the counters were thronged with would-be buyers as we passed through.

The whistle blew, and all the workpeople streamed out, four thousand strong, some going on duty, some going off, and following in the wake of the latter we came to the dormitories.

These are provided for both male and female workers, long light airy rooms, with bedding both on the European and Japanese style, and attached to them is a room where relatives of the workers can stay during a short periodical visit free of charge.

The married employees have houses provided for them, at a rental which is about one-third the current local price, and if there are insufficient houses available it is the practice of the firm to make an allowance towards the rent of some suitable house in the vicinity.

The rents received from the Company's houses are set aside to form a repair and building fund, instead of being turned in to the usual profits and loss account, and as a result of this improvements and additions are being made all the time to the living area.

We went next across the compound to the hospital, a compact building, very clean and with a well-equipped surgery and operating room, and wards for the operatives of both sexes.

Skilled practitioners in the various branches of medicine are always in readiness, and health amongst the employees is encouraged by inspections of the works from time to time.

Any case of illness or injury while on duty is at once passed to the hospital, where the patient is maintained at the Company's expense during his or her illness, full wages being paid, from which is deducted a small charge for medical attention.

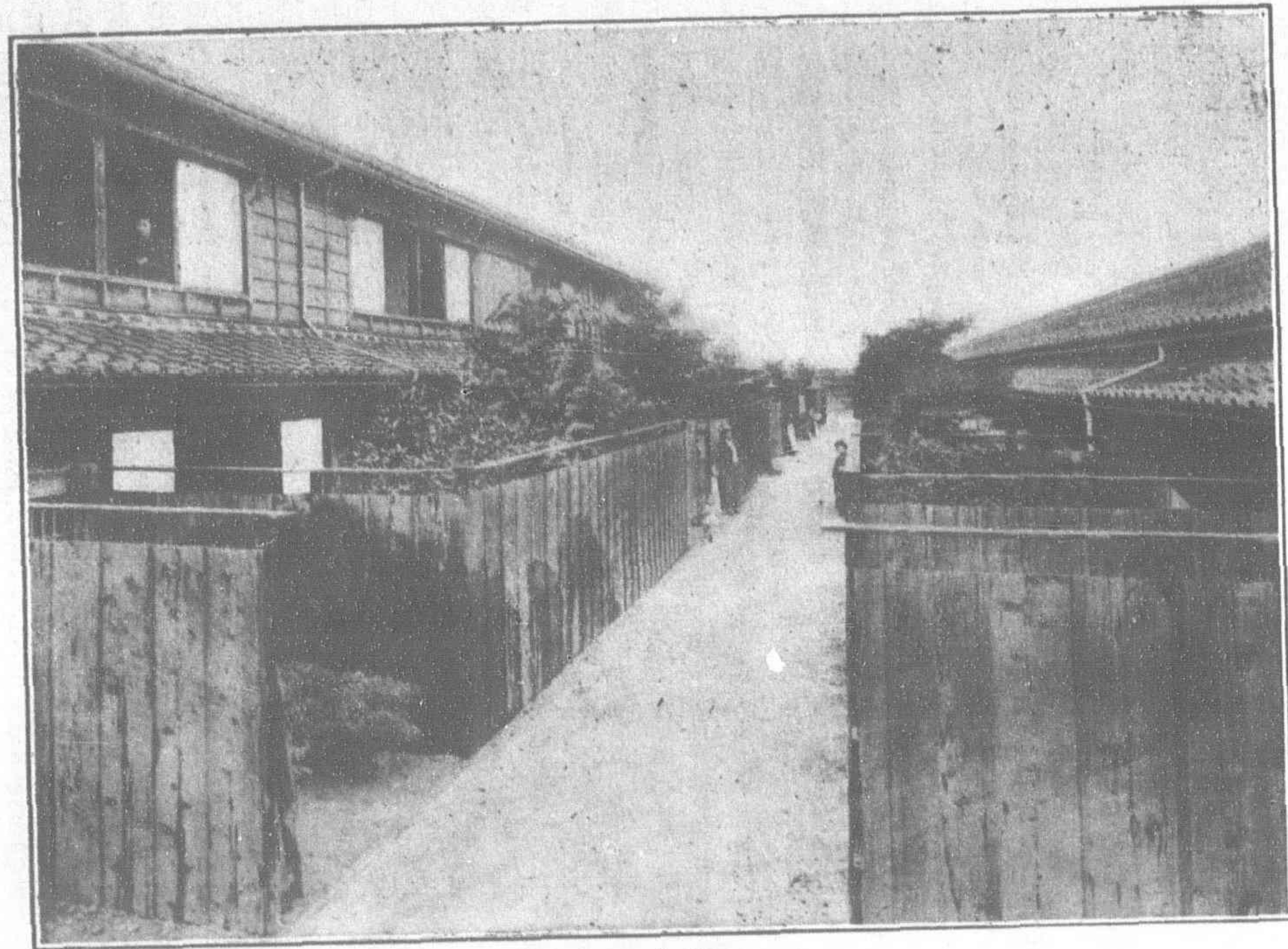
In the case of extended illness or incapacitation from work the matter is considered by a Relief Committee, composed of the heads of departments and various representatives of the employees.

A report or recommendation is made, and forwarded to the managing director for his approval, when the sufferer will receive a pension estimated on liberal terms based on the years of service.

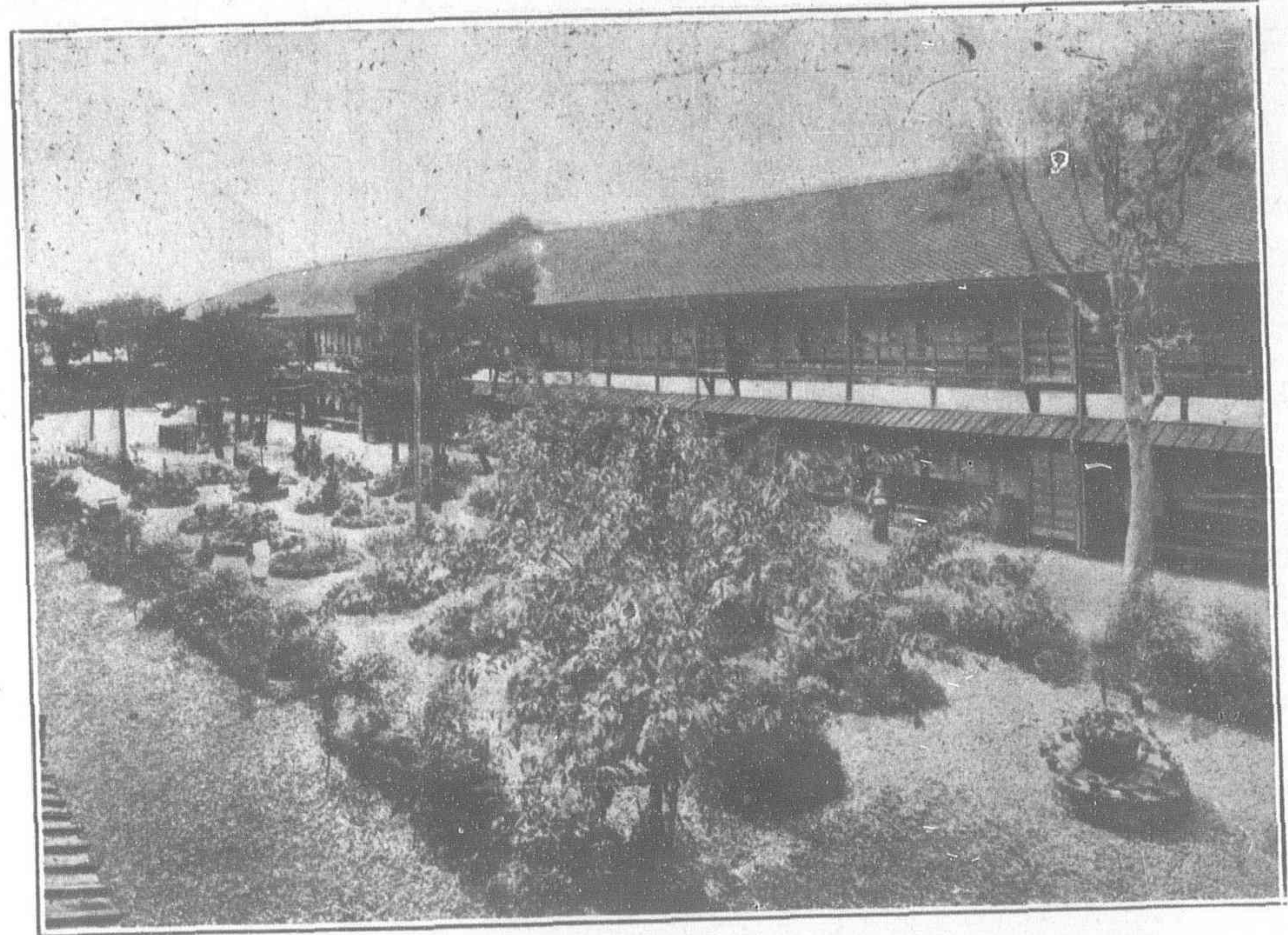
In connection with the question of sickness the Company has given especial care to the subject of tuberculosis, and immediate examination and treatment is given to suspect cases, while two sanatoria have been established at the sea to which the employees can be sent on the recommendation of the staff doctor.

IDEAL INDUSTRIALISM IN JAPAN

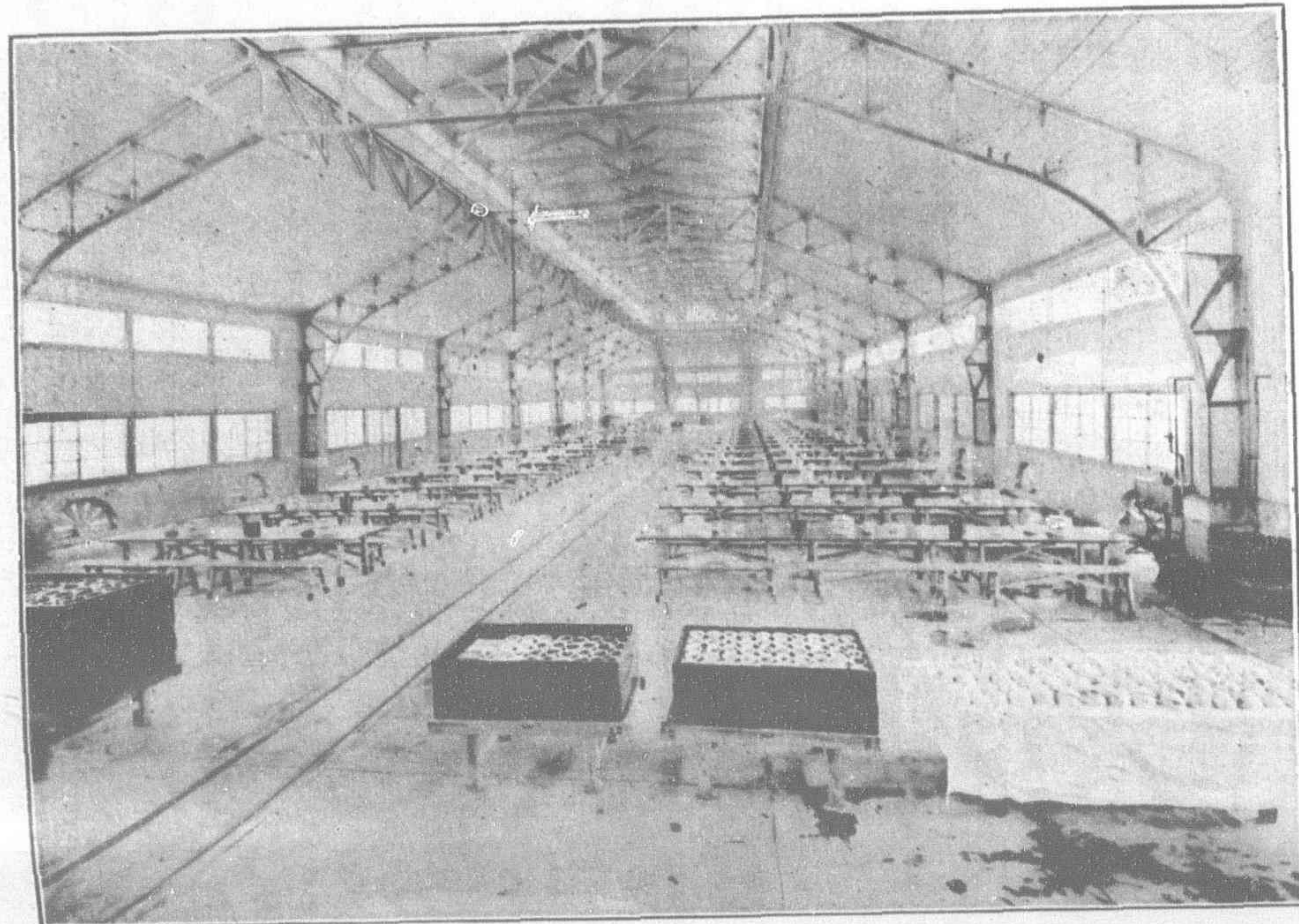
How the Kanegafuchi Spinning Company Watches over the Welfare of its Workers



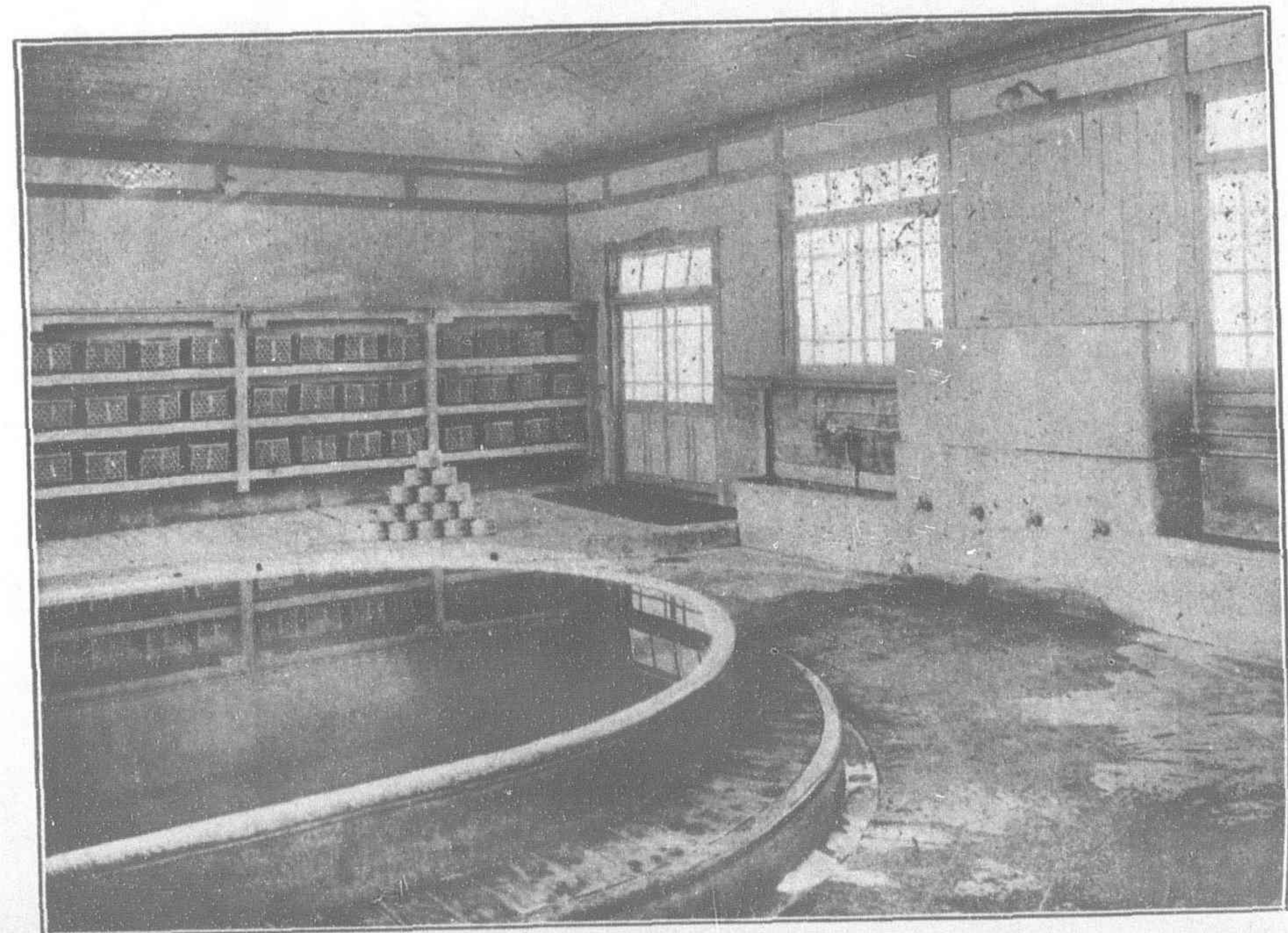
Workmen's Cottages



Women's Dormitory



Dining Hall



Bath Room

IDEAL INDUSTRIALISM IN JAPAN
The Kanegafuchi Idea of the Proper Relation Between Capital and Labor

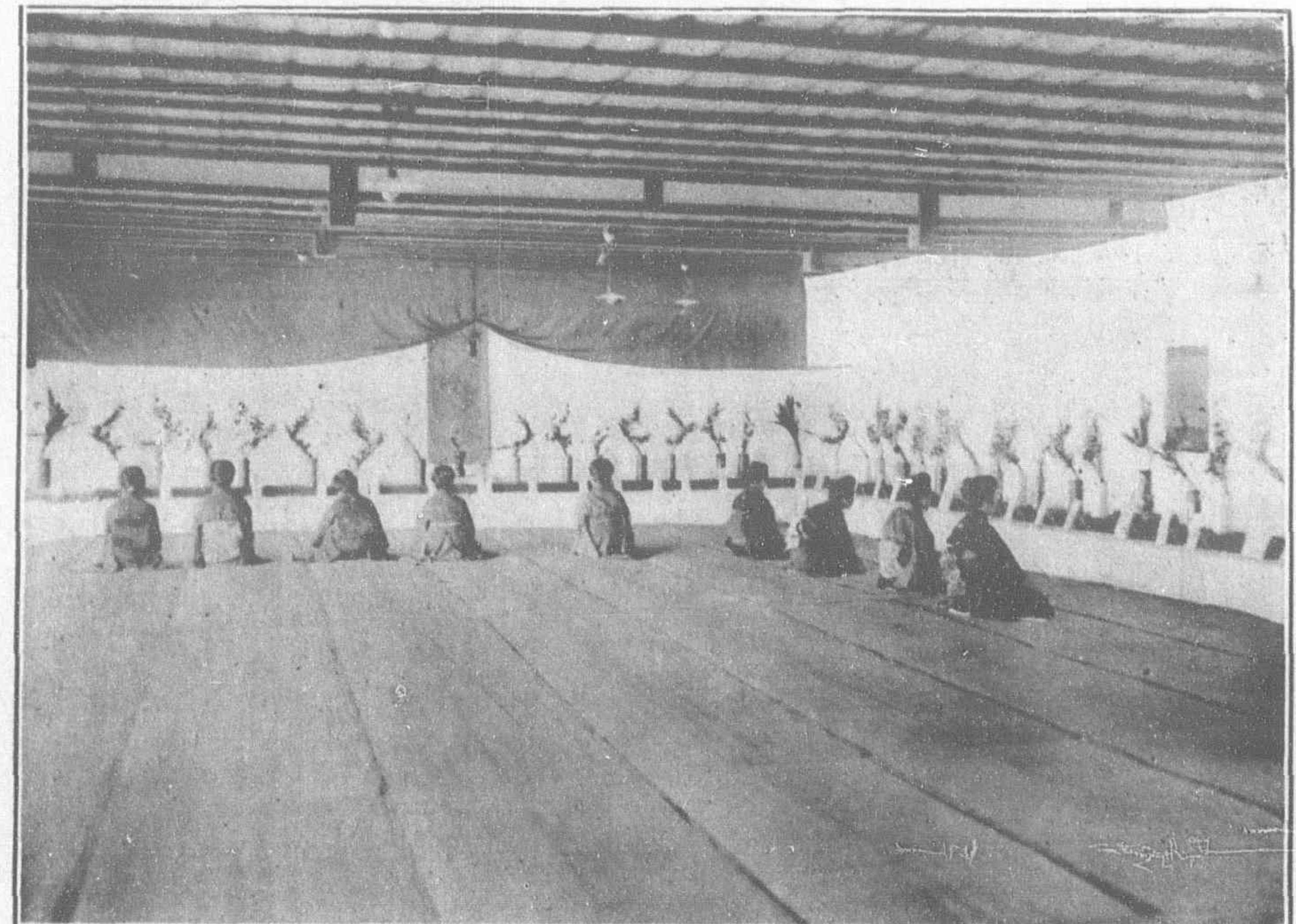
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The Hospital



Display of Flower Arrangement by the Female Operatives, in the Main Hall of the Dormitory



The Kindergarten



The Play-Ground

Health is encouraged in every way possible, for the bath rooms provided on the works are models of their kind, and I can vouch for it that they are used to the limit of their capacity.

The operatives change their dresses on going to work, and the soiled ones are taken to the works laundry and washed immediately, a measure of a value which can hardly be estimated.

Of course the Company is assisted in this by the fact that there is no nation on earth that is so addicted to hot baths as the Japanese, and also that the climate is sufficiently temperate to obviate the ill-effects that would probably follow such exposure in Europe or America.

After going into the question of pensions and sick benefits with Mr. Tawada in more detail than I feel at liberty to do here, we turned to the question of education.

First I was shown the Creche, where the young children of the employees can be left during the day in the charge of skilled nurses while their parents are at work or asleep after being on night shift.

Next, we went a few yards further on to the kindergarten, the next stage in the development of the young idea.

A dozen or more children were engaged in cutting out paper figures or in weaving bamboo work, but though they were bursting with curiosity they rose and greeted me very gravely as befitted a visitor, though it was evident that my companion was such a familiar figure that only my presence restrained them from some more intimate demonstrations.

After the children of employees have passed through their primary and secondary school education it is possible for them to advance further in their studies by means of the educational fund which the Company has founded.

Direct grants may be made from this, or alternatively, sufficient funds may be loaned the student or his parents to carry him through college or the university, subject to gradual repayment without interest in a period of ten years from the date of obtaining a position.

This, I estimate, is one of the most useful of regulations from the point of view of both employer and employee, for there is no

one subject nearer to the heart of the parent in most cases than the advancement of their children, and that this is so is amply proved by the number who have taken advantage of the possibility in the

last few years, and are now holding positions in the employ of the Company in their turn.

One point came to my notice which will be of interest to some, the question of employees on military service.

The practice of the Company is to pay seventy per cent. of the wages to the dependants during the soldiers' absence, and reinstate him with an average increase of pay or other promotion on his return.

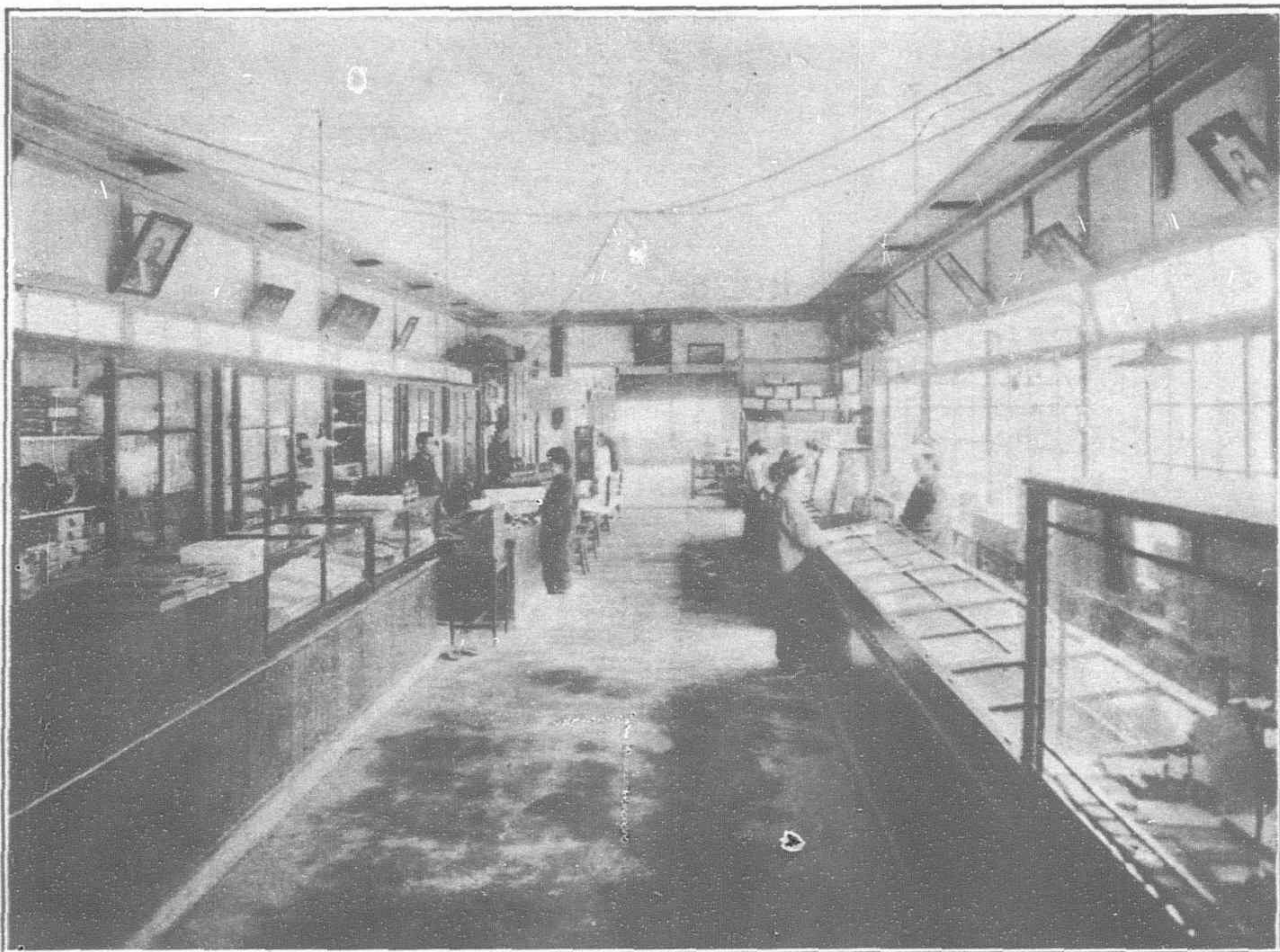
This compares very favorably with the practice of business houses in any other country of which I have cognisance, and must go far towards ameliorating the hardships of conscription.

With regard to other minor items in the Company's program, I would just mention the establishment of tennis courts, baseball ground, etc., on the athletic side, two periodicals on the educational side, and the founding of a savings society to protect the pay of employees, which society, I would mention, pays the rate of 10 per cent., which is satisfactory enough considering the security of the money.

These points which I have enumerated above are only a few of those which struck me, and I could write at length about the cinema theatre, the stage and its dramatic society formed amongst the workers, and countless other items of interest, but enough has been said to indicate the lines on which the works are run, and for the results I can do no better than quote you the words of Mr. Tawada as I was leaving.

"There are on strikes," he said, and in that you have the matter in a nutshell.

The products of the mills, both from American and Egyptian cottons, are used chiefly in Japan; in fact it may be said to be a case of Japan for the Japanese, and if only the other industries in the country will follow the lead thus given them it may be possible for them to escape the industrial unrest and disintegration which is almost universal.



The Retail Company Store

Chinese Chemists Organize

The American chemical society may be the parent of the future "Chinese Chemical Society," according to information from Dr. Robert E. Swain, of the department of chemistry, Stanford University, California.

At a meeting of Chinese students, majoring in chemistry in the University of California and Stanford University, held at Stanford University some time ago, steps were taken to bring together into one organization all of the hundred or more Chinese students engaged in work in chemistry and chemical engineering in the universities of the United States, Dr. Swain reports.

The purpose of the organization, as stated in the constitution which was adopted, is to bring all Chinese engaged in work in chemistry in America into more intimate relationship professionally and socially; to encourage a wider interest in the study of chemistry by the Chinese students at home and abroad, and to promote a higher appreciation of the place of chemistry in the growth of the Chinese nation and the advancement of its people.

The organization is to be called "The Chinese Students' Chemical Association," and already has thirty or more members in western universities. It is expected that before the beginning of the next academic year, the membership will be extended to all of the universities of the United States.

Electrical Developments in Japan

THE UJIGAWA COMBINE

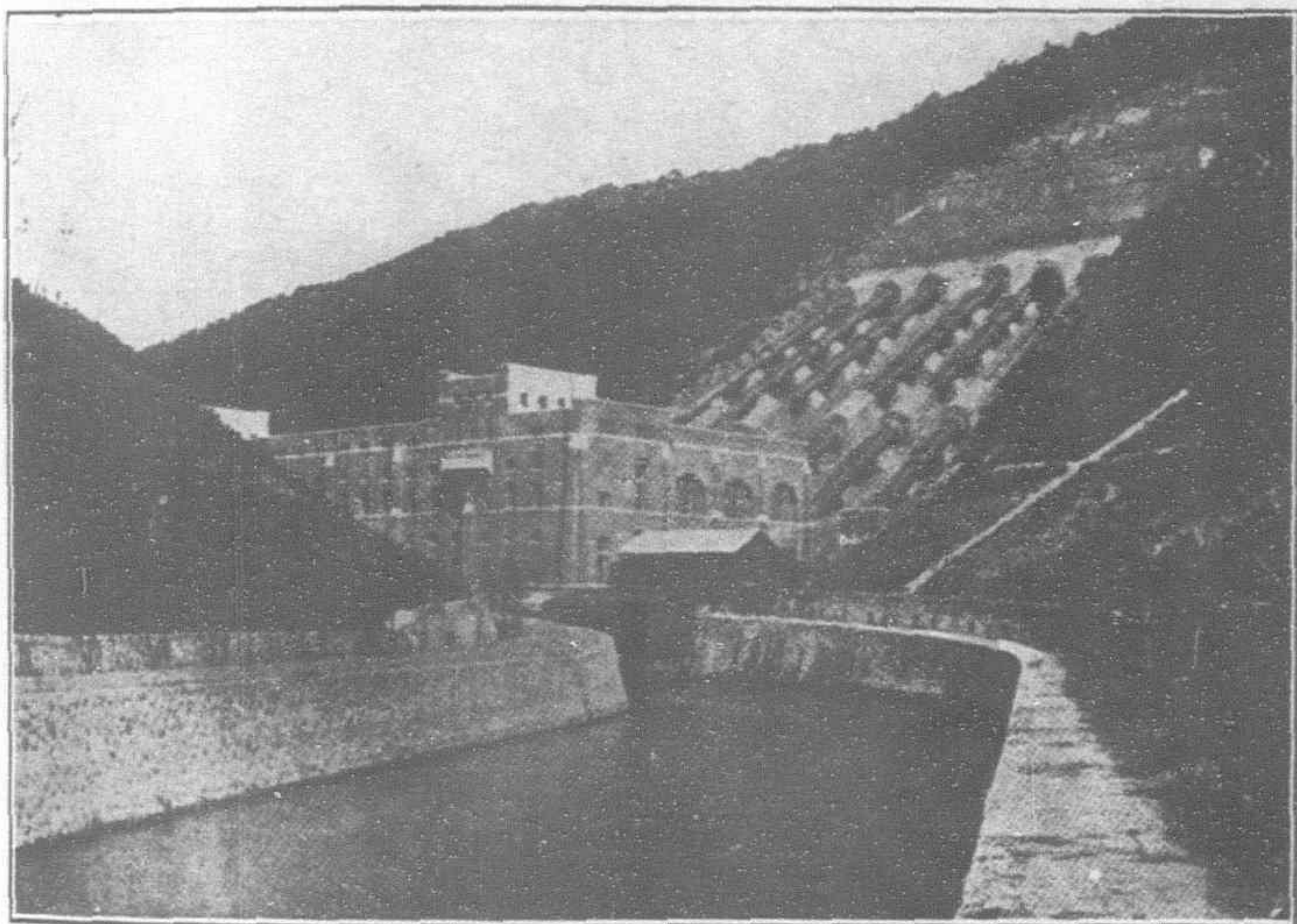
IN September 1921, the Ujigawa Denki Kabushiki Kaisha (Uji River Electric Co., Ltd.), absorbed the Omi Suiryoku Denki K.K. (Omi Hydro-Electric Power Co., Ltd.), and in October, the Yamato Denki K.K. (Yamato Electric Co., Ltd.) At the same time the Ujigawa was actively engaged in building its No. 2 plant, and drawing up plans for a No. 4 plant, and a great steam generating station. Both the Omi and Yamato companies have large construction schemes underway, which, when completed, will make the Ujigawa organization one of the largest in Japan.

The original Ujigawa Denki K.K. was established in 1906, and its first hydro-electric power plant at Uji city on the Uji river was completed in July 1913. The head office of the company is at 98 Kami Nichome, Sonezaki, Kita Ku, Osaka City. During the war when the profits of all electric power companies were very great the Uji and the Inawashiro Hydro-electric Companies, were the only power enterprises in Japan which failed to pay 12 per cent. dividends. The profits of the Inawashiro were maintained at a

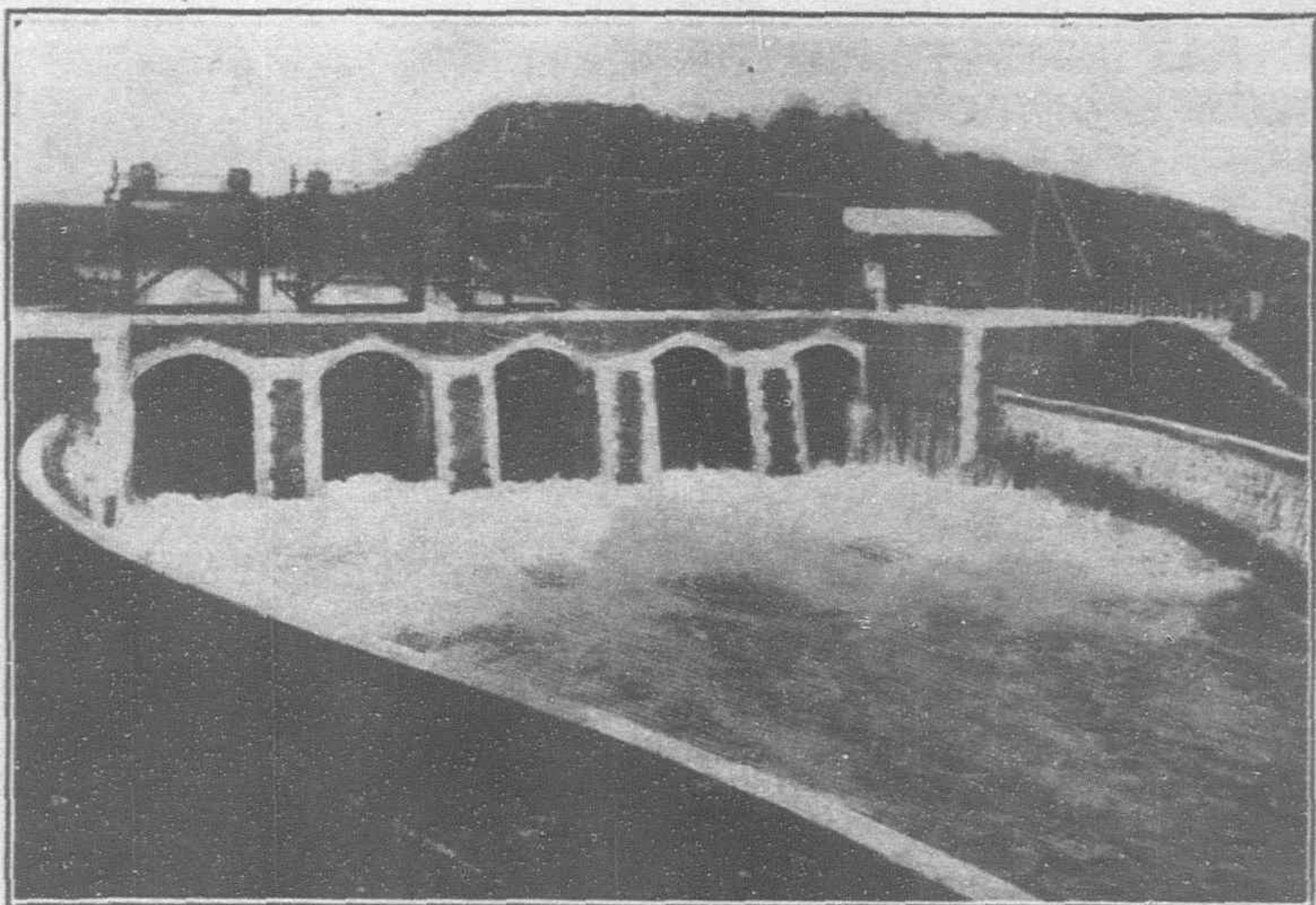
the Ujigawa was obliged to pay 1.2 *rin* (three-fiftieths of a cent U.S. gold) more per kilowatt. During the war the price of coal rose without ceasing, and the Osaka Dento's charge for power supplied the Ujigawa rose too. Unfortunately the company's selling contracts were not on a sliding scale of charges and consequently it was unable to show such splendid profits as other companies supplying power in the great industrial centres. It did manage to raise its own charge to the Osaka Dento to 1.4 *sen* (seven-tenths of a cent U.S. gold) in July, 1918, but coal still continued to rise, and even up to the present time, the Ujigawa Denki is much handicapped by the high price of coal, and the consequent high cost of the power purchased from the Osaka Dento.

This serious handicap made the directors turn their attention to increasing the company's supply of water power. It was decided to construct the No 2 hydro-electric plant, and a large coal-burning station at Fukazaki, Nishi Ku, in the suburbs of Osaka.

Before building the No. 2 power plant, it was necessary to enter into an understanding with the villages along the Uji River.



No. 1 Power House of the Ujigawa Electric Company



Sluice Gates of the Ujigawa Electric Company

low level because of the high cost of constructing its new power stations and main transmission lines to Tokyo; added to the fact that all its power was sold to the Tokyo Dento K.K. on a long-term contract at a very low rate.

During the first two years of the war, the Ujigawa generated only 23,350 kilowatts; from 1916, this was increased to 29,000, by increasing the head of water at its principal generating station. The Osaka Dento K.K. bought 2,500 kilowatts in the daytime, and 32,000 kilowatts at night. Four thousand kilowatts were supplied to the Kyoto Dento K.K., and the Osaka city electric bureau bought 2,000 kilowatts. Besides these large consumers, the government arsenal, mint, and several big industrial concerns bought a considerable amount of power. The 29,000 kilowatts generated from its own power plants was not enough to meet all demands so the company bought 10,000 kilowatts from the Osaka Dento K.K., which was supplied from that company's steam power plant in Osaka city.

The Ujigawa Denki K.K. supplied power to the Osaka Dento at 8 *rin* (four-tenths of a cent U.S. gold) per kilowatt, and to the Osaka city electric bureau at 6 *rin* (three-tenths of a cent U.S. gold) per kilowatt. But it bought power from the Osaka Dento on a sliding cost scale, based on the price of coal at Y.50,000 per 10,000 *kin* (13,333 pounds). For every advance of five *yen* per coal unit,

This required long-drawn-out negotiations and permission was not easily obtained. Construction is now being rushed on the Fukazaki coal-burning power plant, which occupies 875 *tsubo* (31,500 sq. ft.). The effective generating capacity of this station will be 20,000 kilowatts, with 10,000 kilowatts reserve power for emergencies, a total of 30,000 kilowatts. In May 1920, five thousand kilowatts of plant were installed and the balance will be in operation by the end of 1922.

Osaka lies in the midst of a great plain, and water power must be obtained from distant sources. In the beginning of the hydro-electric industry in Japan it was difficult to transmit power over long distances, but to-day conditions have been so advanced and power equipment so greatly improved that distance no longer deters such enterprise. The Daido Denryoku K.K. and the Nihon Denryoku K.K., have built power houses in Shinano, Etchigo and Hida provinces in central Japan, a hundred miles and more from Osaka. The Nihon Denryoku will supply this year 20,000 kilowatts from its distant power houses to Osaka; next year, 45,000 kilowatts, and in two or three years it will generate 100,000 kilowatts for transmission to the industrial centre of the country.

The largest supplier of hydro-electric power to Osaka to-day is the Ujigawa Denki K.K. When the above-mentioned two new companies enter the field in competition, the power situation in Osaka will be greatly complicated.

Despite the relation of buyer and seller existing between the Ujigawa and the Osaka Dento they are bitter rivals for supremacy in Osaka, and as the Daido Denryoku is operating in connection with the Osaka Dento, the Uji company has another formidable competitor to face.

It behooved the Ujigawa not to stand idle and await this threatened competition, and in order to prepare for the future the amalgamations with the Omi Suiryoku and the Yamato Denki were carried out.

The Omi Suiryoku possesses a license for the exclusive supply of light and power in 130 towns and villages in North Omi province. Its boundaries embrace the towns of Hikone, Yawata, Nagahama and Minakuchi, where industry is making great strides. There is a great demand for power in Omi, but little supply at present.

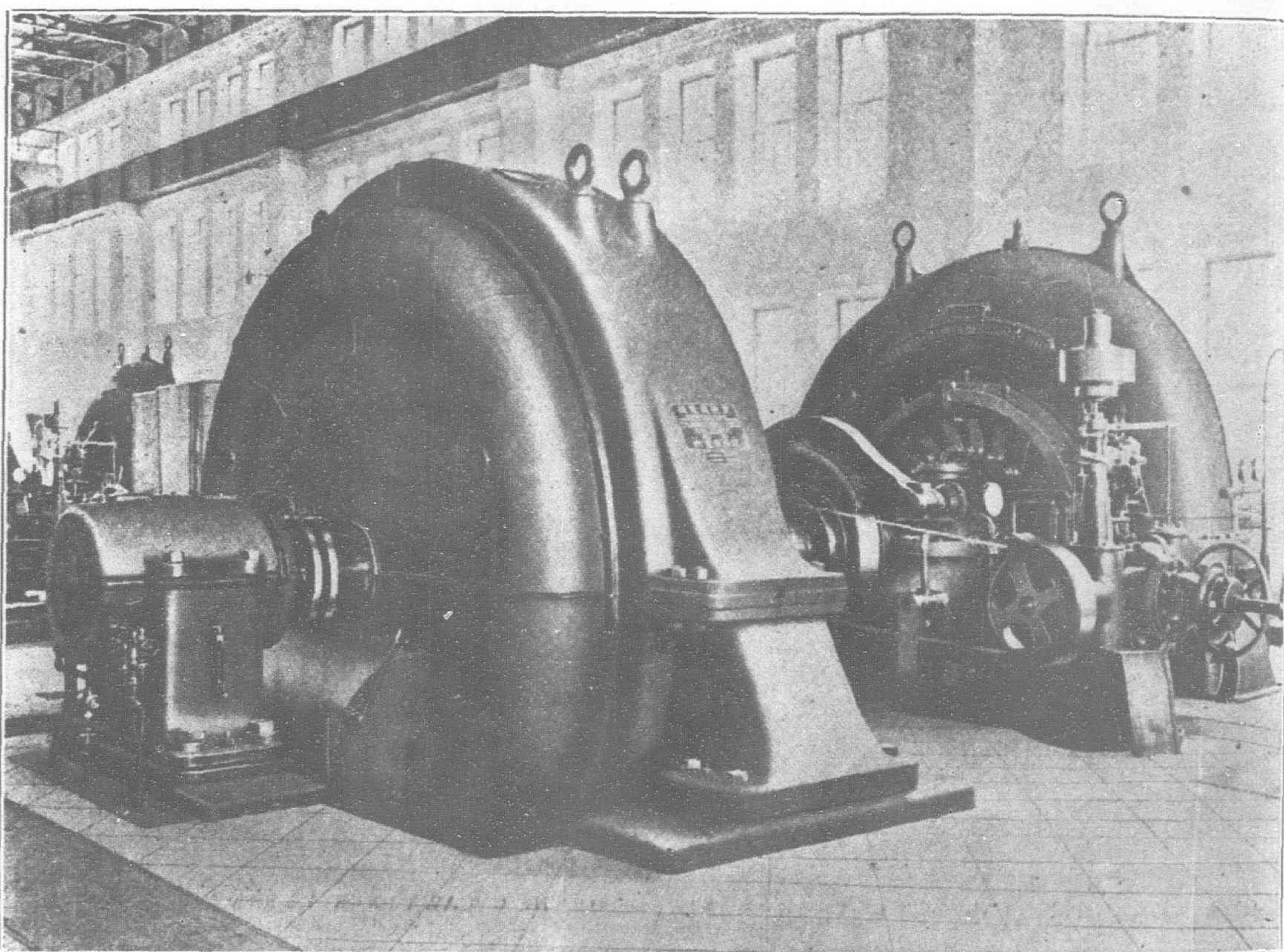
The Yamato Denki is licensed to supply light and power in certain districts in Nara prefecture. Oji, Gojo, Kamiichi, and Shimoichi lie within its boundaries. So far, this company has shown very poor results, and the reason for the merger with the Ujigawa is easily understood. The districts between Nara and Wakayama in which the Yamato Denki operates, are watered by two rivers, the Totsuka river and the Kumano river, which have great potential power in their upper reaches.

The Ujigawa and the Nihon Denryoku are related companies and will not compete, but the Daido Denryoku will be a serious competitor. According to inspired statements the Daido will supply power in Osaka at 3 *rin* per kilowatt less than the Ujigawa. The Daido holds a license to supply power in Osaka, but it has not yet succeeded in obtaining a license to supply light, but because of its relations with the Osaka Dento this class of business will perhaps not be attempted in Osaka city. However, because of the uncertain market for power, which varies in consumption according to economic conditions, all electric power companies are eagerly seeking licenses to supply light, for which the demand has never decreased, but continually grows greater and greater. The large power concerns are all trying to obtain control of small local lighting companies, and the Kansai Denki already mentioned, has annexed ten and more companies with this end in view. The Daido and the Kansai are both financed by the same capitalists, and hopes are expressed of an eventual merger. Such an amalgamation would be very advantageous to the Kansai as the Daido owns many very valuable power sites and licenses.

The Daido, and the Kansai are both operating in the vicinity of Nara, and if they should obtain power sites on the Totsuka and Kumano river, it would place the Ujigawa on a very disadvantageous position with powerful competitors on all sides of it. The Yamato Denki business has still to show good results, but it owns valuable power rights on these two rivers, and is potentially very powerful. From the Yamato power sites to Osaka is 50 miles, while from the Daido's Yomikaki power plant on the Kiso river to Osaka city it is 144 miles. The Yamato's lines need be only one-third this length. This was the reason behind the purchase of this concern by the Ujigawa Denki K.K.

The No. 1 power plant of the Ujigawa and the Fukuzaki power plant are exclusively for generating power for industrial motive uses. Since the merger with the Omi and the Yamato companies, the Ujigawa has commenced the supply of power for lighting. The present business of the company is listed below:—

No. 1 power plant generates..	..	..	29,000	kilowatts
Fukuzaki plant	..	..	20,000	..
Omi Suiryoku owns four power plants				
generating	..	..	2,132	..
Yamato Denki generates	..	..	1,050	..
<hr/>				
Water power	..	..	32,182	..
Coal	..	..	20,000	..
<hr/>				
Total	..	..	52,182	..



The No. 1 Power House of the Ujigawa Electric Company, equipped with Six Water Driven Alternators, 7,000 k.v.a., 12,000 volts, 360 r.p.m., 60 cycles, made by the Shibaura Engineering Works of Tokyo

Omi Suiryoku supplies	..	..	144,029	lights
Yamato Denki	..	..	39,000	..
<hr/>				
Total	..	..	183,029	..

The capital of the Ujigawa was originally Y.12,500,000, but this was increased to Y.25,000,000 in 1916. The capital of the Omi Suiryoku was Y.4,000,000, but it was purchased for Y.6,500,000, and on making the merger the capital of the Ujigawa was increased to Y.31,500,000.

The Yamato Denki was capitalized at Y.5,000,000, of which Y.2,060,000 was paid up. It was purchased at a valuation of Y.6,250,000, and the capital of the Ujigawa was expanded to Y.37,650,000 when the merger was made. Of this amount, Y.34,650,000 was paid up. The balance of Y.3,000,000 was paid in two instalments of Y.1,500,000 each in March and May of this year, making the present capital all paid up.

The total cost of equipment and construction of the Ujigawa Denki K.K. merger, to the end of May 1922, amounted to

Y.52,543,821. Debentures of Y.16,500,000 have been issued to meet the excess construction costs.

No. 1 water power plant	Y15,917,012
Fukuzaki steam plant	5,952,158
Osaka transformer station and equipment ..	13,633,561
Omi Suiden power equipment	2,029,333
Omi Suiden electric light equipment	3,240,025
Yamato Denki power equipment	976,837
Yamato Denki light equipment	735,967
No. 2 power house, estimated costs to date ..	4,166,366
Omi Suiden plans for expansion	1,661,948
Yamato Denki plans for expansion	4,430,614
	<hr/>
	Y52,543,821

The No. 1 power plant transmits its power to a transformer station at Noe. The total cost per effective kilowatt generated, estimated at 26,500 kilowatts, was only Y.600.00 for the power plant alone. Including the Noe transformer station and all transmission line costs, this rises to Y.1,115 per kilowatt, which is not particularly expensive for this construction in Japan.

The costs of construction per kilowatt of effective power of the Omi Suiden was Y.95.00, and of the Yamato Denki Y.93.00. These are very low costs, but the equipment is on a very small scale, and construction was completed before prices rose, so they were built very inexpensively.

Averaging the costs of all the hydro-electric power generated by the present Ujigawa organization they amount to Y.514 per kilowatt. The amalgamations have therefor materially reduced the construction costs per kilowatt.

The Omi and Yamato supply 183,000 lights. The equipment for these lights cost Y.3,970,000, making the cost per light supplied Y.21.73. In places where population is large, this is not too high; in Osaka city the average cost is Y.13.00 per light, but in North Omi, and in the Yamato Denki's boundaries, where dwellings are scattered over a great deal of territory, the average equipment cost per light is Y.21.00. The Fukuzaki power plant has cost Y.287.00 per effective kilowatt. Machinery is cheaper to-day than at the time the plant was ordered, but taken all in all this cost is not too great.

The Ujigawa Denki K.K. has many plans for increasing its power supplies. They include adding 42,250 kilowatts to its effective water power, and 30,000 kilowatts to the coal-burning plants efficiency. Two plants will be built to operate in the territory of the Yamato Denki, at Shirakawa and Suriko, to generate 8,000 kilowatts. In the boundaries of the Omi Suiyoku a plant to generate 2,250 kilowatts will be built at Kawada. The total estimated costs of construction for all these projects reaches Y.38,200,000.

The principal project under way now is the construction of the No. 2 power plant.

The No. 2 and the No. 4 power plants will utilize the stream of the Uji River. No. 2 is being built on the upper stream of the river about four miles up-stream from Ujibashi at Tawara Mura, Suzuki Gun, in Kyoto prefecture. A dam will be built to the opposite bank of the river, at Makishima Mura, Kuse Gun, and from the dam a canal 6,400 feet long will be constructed to the power house. The fall will be 150 feet, and the effective head of water 2,800 cu. ft. per minute.

The No. 1 power house generating 291,000 kilowatts receives an effective head of 2,800 cu. ft. from Ishiyama near Lake Biwa, by means of a canal beginning at Nango, which has a fall of 205 feet to Uji city.

Between Nango and Uji city, the Uji river makes two great turns, one at Ishiyama, and the other at Makishima. This last is a very great bend which the No. 2 power plant will utilize.

The No. 4 power plant will utilize only the excess of water from the No. 2 plant at Makishima. At No. 1 plant the Uji river gives 2,800 cu. ft. of water, at No. 2 the same amount, but during the season when the water is low, the head of water will be not at more than 2,000 cu. ft. The No. 2 and No. 4 plants will divide this 2,000 cu. ft., and 70-foot fall will be effective for the generator the No. 4 plant. However, it will not be able to operate at all times when the water is low. Its maximum efficiency is estimated at six months a year.

The No. 2 plant will generate 26,000 kilowatts, and No. 4, 9,000 kilowatts. At No. 2 one cu. ft. of water will produce 9.3 kilowatts, at No. 4 it will produce only 4.5 kilowatts. No. 2 power plant is down stream from No. 1, and it will use the water of the main stream of the Ujigawa. The Uji river has a large volume of water, but its fall is slight. In this respect the Ujigawa Denki's source of power is like that of the Inawashiro Suiden. At No. 1 the fall is 1 in 180, but at the Inwasahiro No. 1 power plant the fall is 1 in 20. At No. 2 plant of the Ujigawa the fall is 1 in 34, and the ground and subsoil are very hard, and because of this the cost of construction will probably be high. The district, however, is most convenient for transmitting power to Kyoto and Osaka, and accordingly there will be little expense for transmission lines, etc. One kilowatt of effective power will probably cost from Y.630 to Y.640.

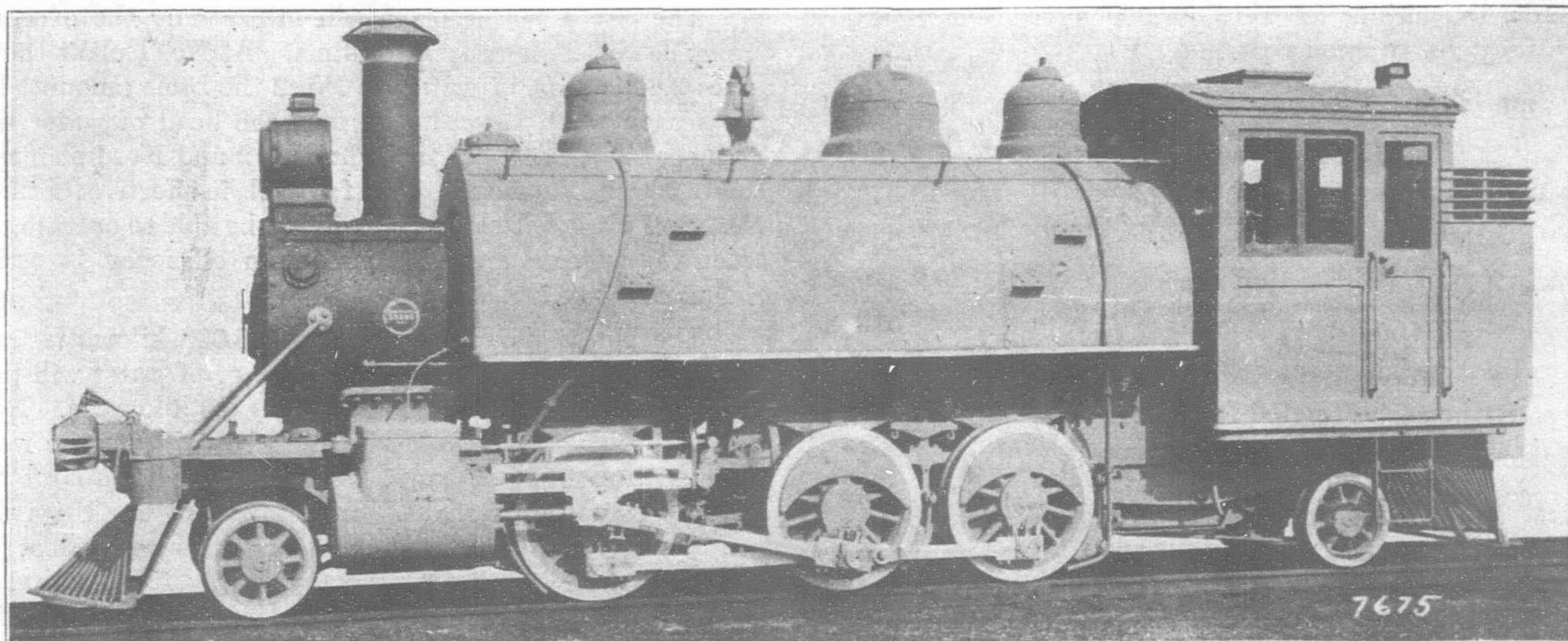
The great advantage the Ujigawa Denki over all competitors lies in its nearness to the consuming centres. Its power lines are gradually being improved and transmission losses have been cut to a minimum. From the Uji No. 1 power plant to Kyoto is only 8 miles, to Osaka 21 miles. The Inawashiro Suiden is 140 miles from Tokyo. The Daido Denryoku and the Nihon Denryoku are respectively 144 miles and 189 miles from Osaka. Consequently the profits of the Ujigawa compared to those of the other companies should be proportionately greater. No. 2 power house in comparison with No. 1 with its fall of 1 in 180 will have many advantages.

The Fukuzaki coal power plant might seem superfluous with these great potentialities from the Uji river. But it is extremely necessary to maintain a steady supply of power sufficient to cover all demands. Water power is insufficient and No. 4 station will be out of operation more than six months of the year. This is why the Fukuzaki station is being augmented by 10,000 kilowatts. Even this is insufficient because of competition with the Osaka-Kyoto Electric Railway, so a No. 3 coal-burning power plant to generate 10,000 kilowatts is now being planned.

No. 2 and No. 4 power plants will be completed in 1923. The Shirakawa power plant will be partly completed and in operation by October this year, and the Suriko plant will be completed in April, 1923. The Kawada plant was completed in April this year. Two coal-burning plants in Osaka and Kyoto will also be completed this year.

The No. 3 power plant to generate 10,000 kilowatts is now being worked out by the engineering staff. Another plan embraces the construction of a hydro-electric power house on one of the sites of the Yamato Denki, to generate 4,000 kilowatts. Costs of construction of all these plants and the necessary transmission equipment are estimated to be Y.44,700,000. In future, the light and power equipment of the Omi and Yamato companies will require expansion, and this will make more demands upon the company's funds. Besides the Ujigawa Denki will shortly be called upon to pay up a part of its share of the business of the Nihon Denryoku already mentioned as preparing to supply 100,000 kilowatts in Osaka within the next three or four years, in which the Ujigawa is one of the principal shareholders. A part of the outstanding debentures must also be redeemed shortly, and the Ujigawa Denki K.K., as it is now constituted, and with the plans for construction it has in hand, stands in need of about Y.60,000,000 to complete its plans.

It is generally believed in the money market that the Ujigawa Denki K.K. will double its present capitalization before the end of 1922. But even this will not provide all the money needed for construction. The balance will be raised by debentures.



"Prairie" Type Switching Locomotive for the Peking-Suiyuan Railway, built by the Baldwin Locomotive Works

Switching Locomotive for China

THE Peking-Suiyuan Railway which taps China's great northwest has now about 400 miles of standard gauge (4-ft. 8½-in.) track open and is one of China's most important railways, from both political and industrial standpoints. The line was constructed entirely with Chinese capital and by Chinese engineers, having been originally conceived by Dr. Chan Tien-yu, better known to foreigners as Jeme Tien-yu.

Construction was started in 1905 under Dr. Chan, on the Peking-Kalgan section. In 1909 public service was begun. This section of line, about 122 miles long, is without doubt the most remarkable piece of railway engineering yet carried out in China. The tunnel under Nankow pass is the longest yet bored in China, its setting being extremely picturesque, and is yearly visited by thousands of tourists.

In succeeding years, construction of the line from Kalgan to Suiyuan proceeded and on May 1, 1921, the railroad was opened as far as Suiyuan, the first train being hauled by one of the Baldwin locomotives herein described, of which 17 are now owned by the Railway, four having been purchased in 1910, three in 1919 and ten in 1920.

Locomotives of this type are peculiarly adapted for switching, general utility and construction service, being a self-contained unit and having a short rigid wheel-base which, combined with the guiding and supporting features of front and rear trucks, makes the locomotive safe to operate in either direction on light rails and over short radius curves.

The photograph herewith shows one of the ten locomotives which were ordered in May, 1920, with a request for early shipment. In October of the same year the engines were on their way to China.

These locomotives are designed for ruling grades of one per cent. and have a straight top boiler and a steel firebox. The piston

valves are actuated by Stephenson valve motion and controlled by a screw reverse gear. The brakes are of the Baldwin steam type schedule U. 6. In common with the practice on Chinese Government Railways, M. C. B. automatic couplers are employed. Other special equipment includes Coale safety valves, Ashcroft steam gauges, Baldwin water gauges, Monitor injectors, oil head-lights and Nathan double bulls-eye lubricators.

Gauge	..	..	4' 8½"
Cylinders	..	..	16" x 24"
Valves	..	..	Balanced

BOILER

Type	..	..	Straight top
Diameter	..	..	50"
Thickness of barrel sheets	..	..	½" 9/16"
Working pressure	..	..	180-lbs.
Fuel	..	..	Soft coal

FIREBOX

Material	..	..	Steel
Staying	..	..	Radial
Length	..	..	60' 16"
Width	..	..	34½"
Depth, front	..	..	57½"
" back	..	..	53"
Thickness of sheets, sides	..	..	½"
" " back	..	..	¾"
" " crown	..	..	¾"
" " tube	..	..	½"

WATER SPACE

Front	..	..	4"
Sides	..	..	3"
Back	..	..	3"

TUBES

Diameter	..	..	2"
Material	..	..	Steel
Thickness	..	..	No. 12 W. G.
Number	..	..	152
Length	..	..	13' 6½"

HEATING SURFACE

Firebox	..	..	90 sq. ft.
Tubes	..	..	1,071 sq. ft.
Total	..	..	1,161 sq. ft.
Grate area	..	..	14.4 sq. ft.

DRIVING WHEELS

Diameter, outside	..	..	44"
" centre	..	..	38"
Journals, main	..	..	7" x 8"
" others	..	..	7" x 8"

ENGINE TRUCK WHEELS

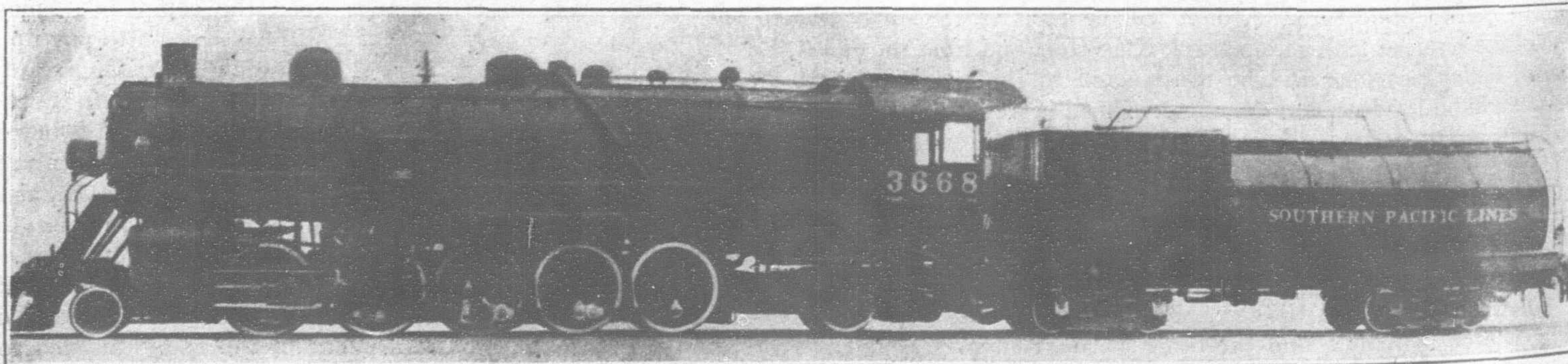
Diameter, front	..	..	28"
Journals..	..	..	4½" x 7½"
Diameter, back..	..	..	28"
Journals	..	..	4½" x 7½"

WHEEL BASE

Driving	..	..	10' 0"
Rigid	..	..	10' 0"
Total engine	..	..	25' 9"

WEIGHT

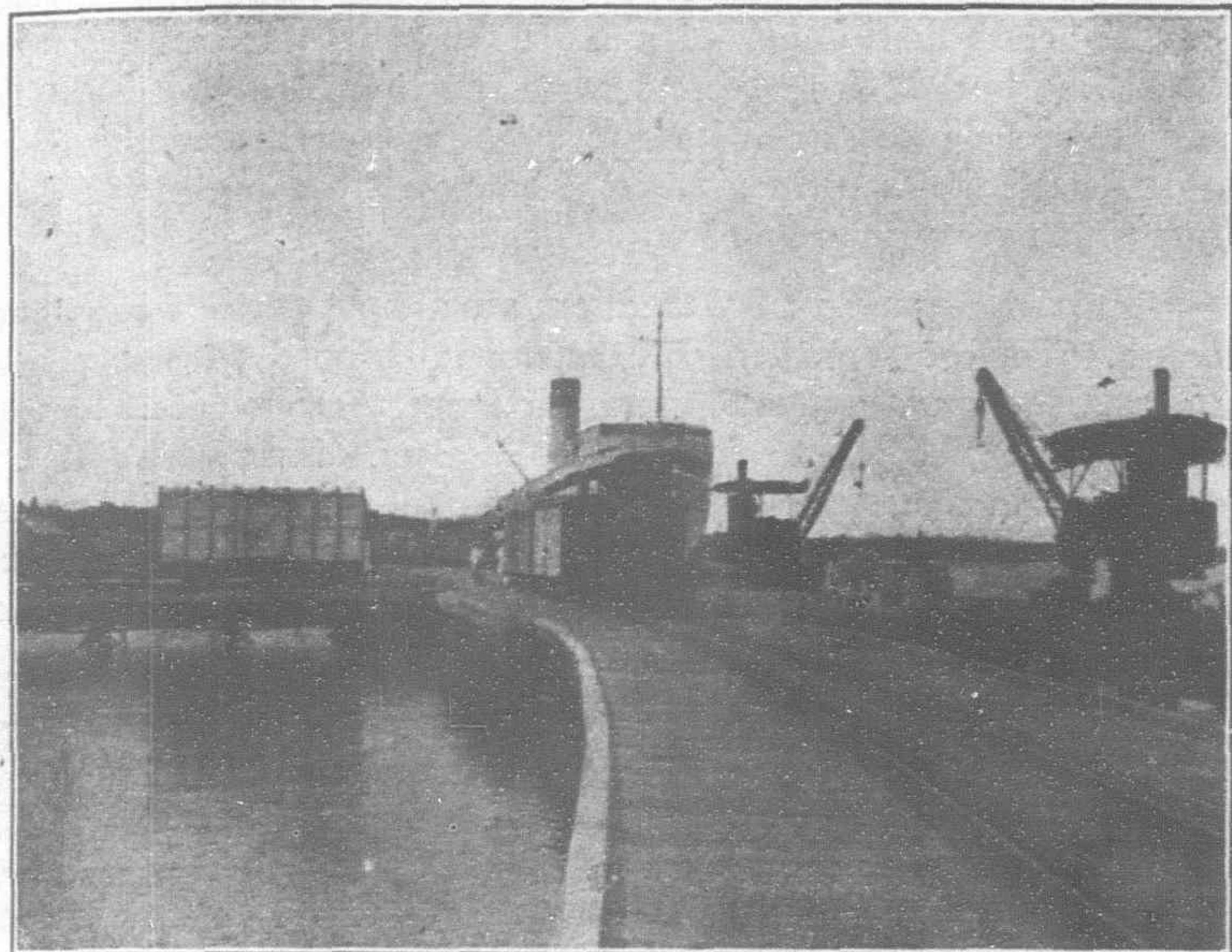
On driving wheels	..	..	87,850-lbs.
On truck, front	..	..	11,250-lbs.
" back	..	..	14,000-lbs.
Total engine	..	..	113,100-lbs.
Tank capacity	..	..	1,600 U.S. gals.
Fuel	..	..	5,000-lbs.
Service	..	..	Switching



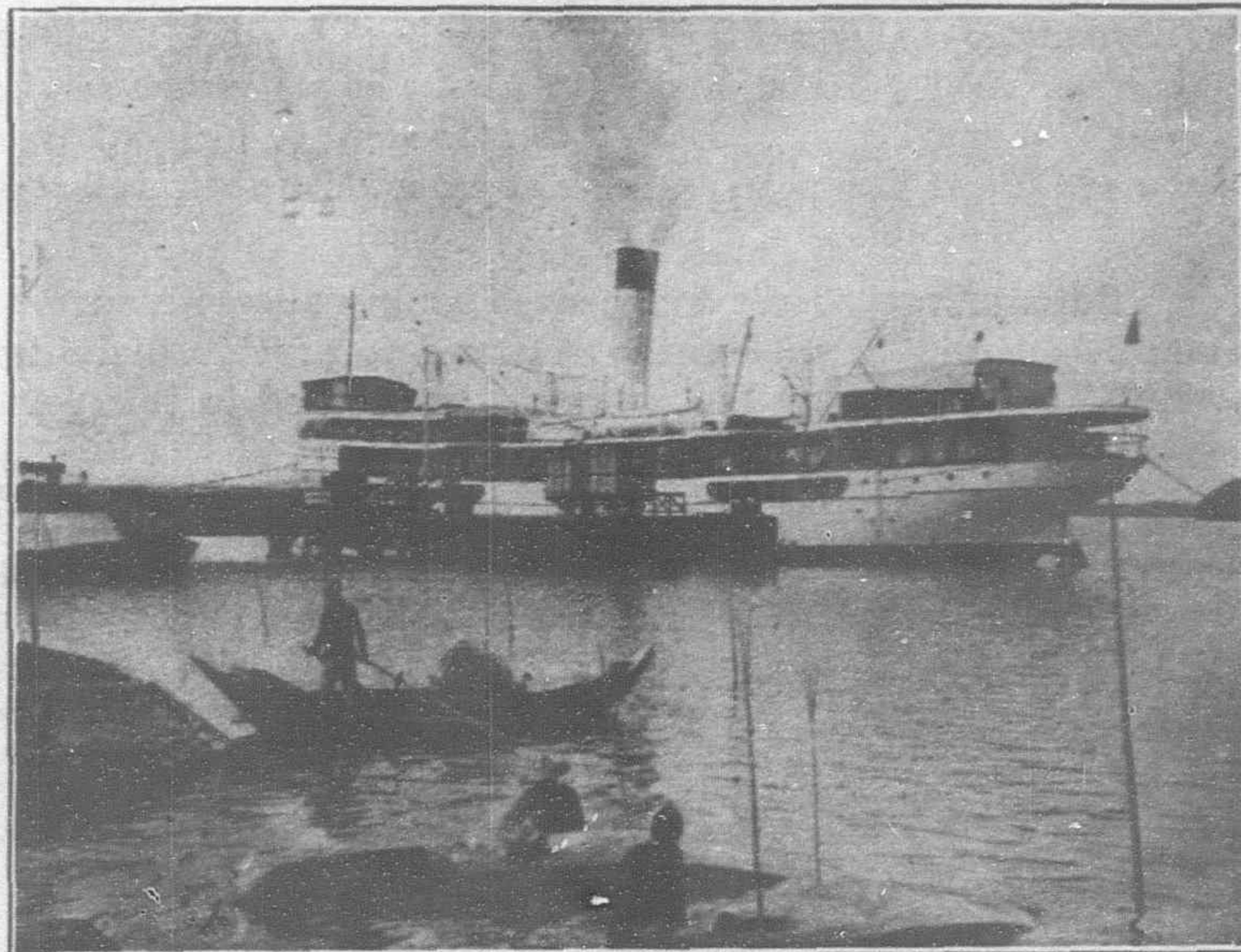
Fifty of these Santa Fe Type Locomotives Just Built by The Baldwin Locomotive Works for the Southern Pacific Lines

Building Ports in Malaya

By L. G. Blochman



The Deep-water Wharf at Port Swettenham



One of the three Wharves for Coastwise Vessels at Port Swettenham

ALTHOUGH the tin and rubber slump has temporarily caused a retrenchment of many development schemes and has forced an economy of both passenger and freight trains service on all lines, the Federated Malay States railways are going ahead with two major projects calling for an expenditure of close to \$32,000,000 Straits currency.

Curiously enough, neither of the projects is in the F.M.S. proper. One is the construction of a causeway bridging the straits between Johore Bahru, in the independent state of Johore, and Woodlands, on the island of Singapore, Straits Settlements. The other is known as the Prai scheme, and consists in making a deep-water port at Prai, opposite Penang on the mainland of Province Wellesley, Straits Settlements.

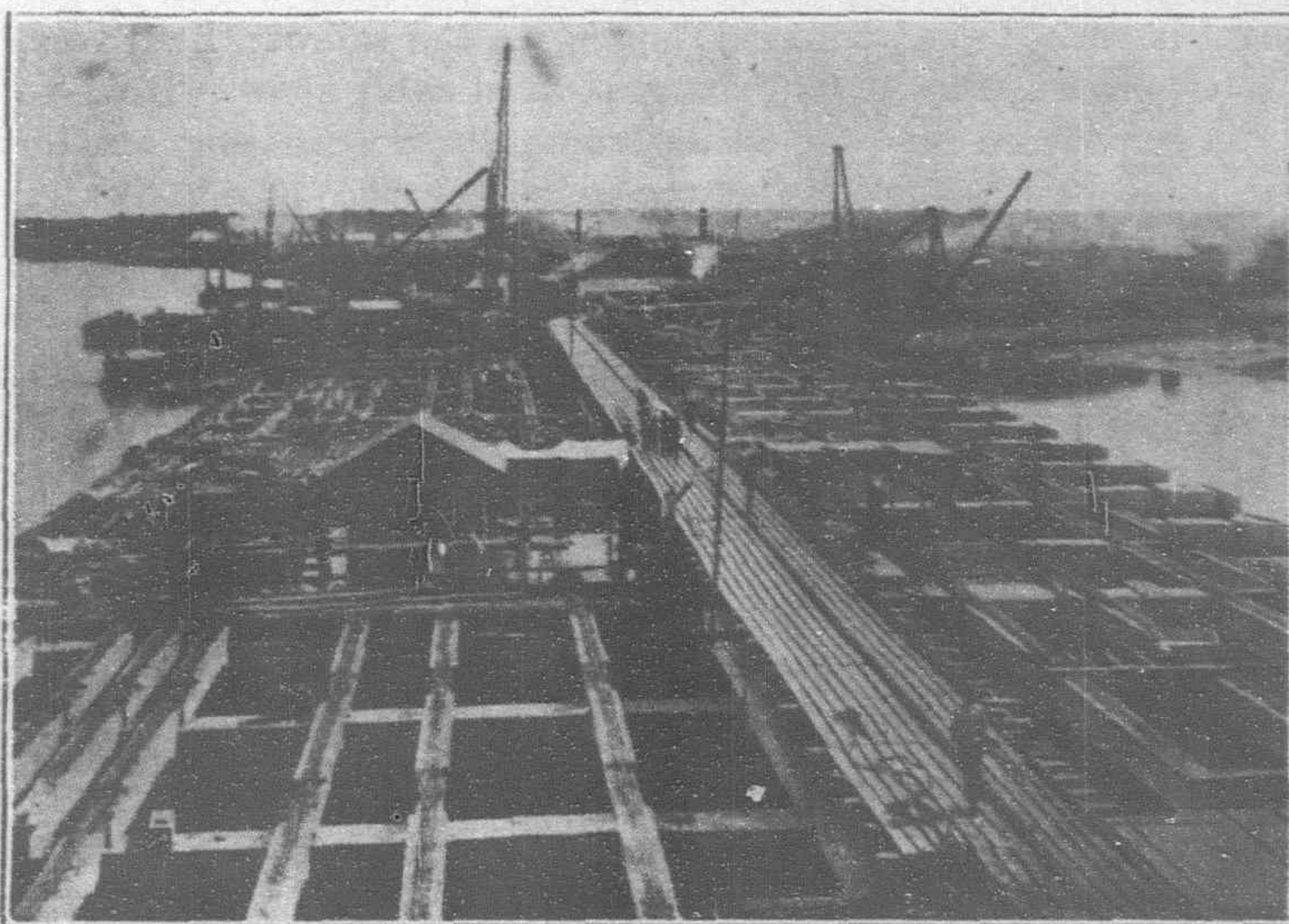
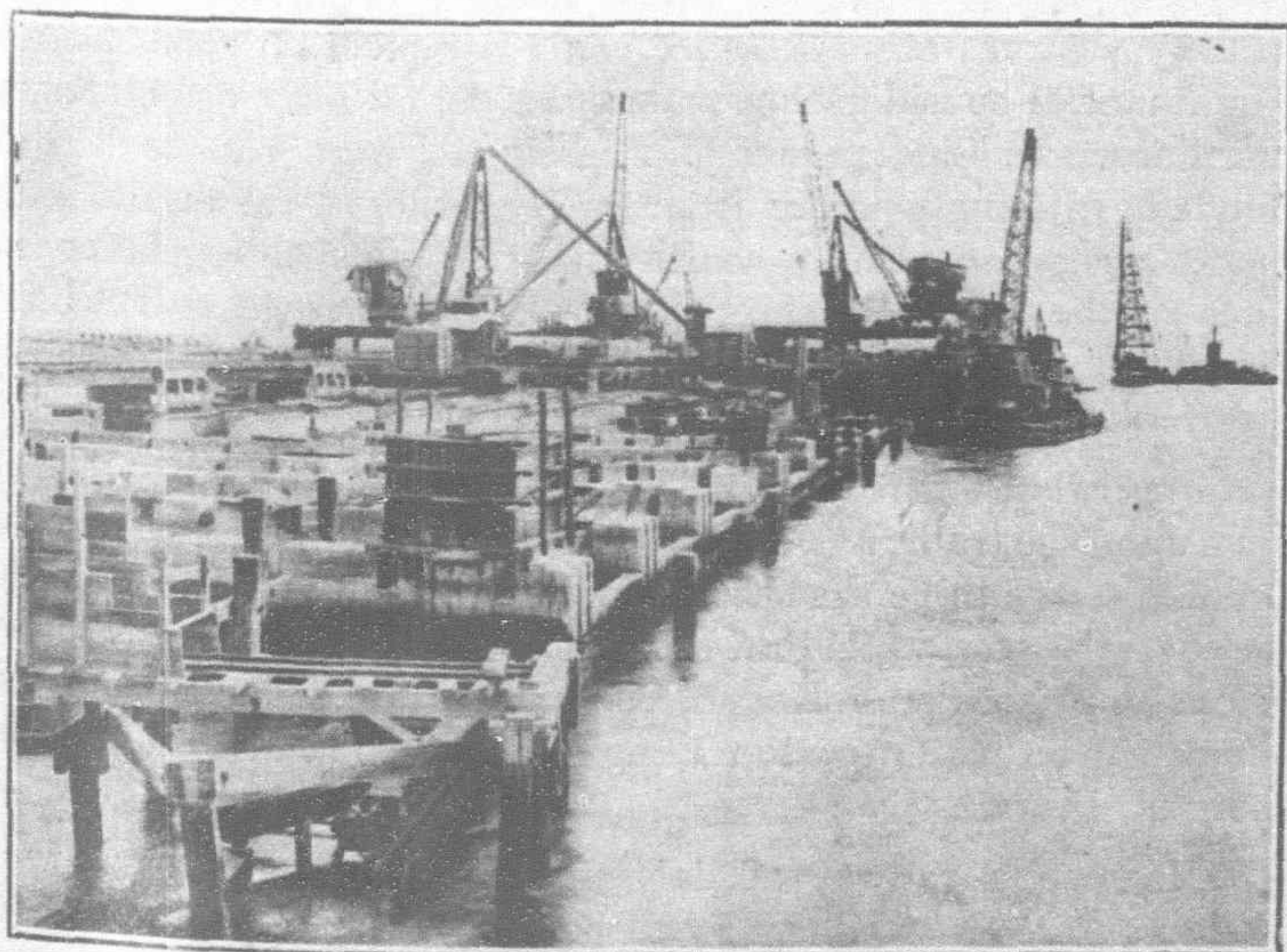
The completed Prai scheme will cost \$21,450,000, it is estimated. Of this amount approximately \$1,500,000 has gone into doubling the line between Prai and Butkit Mertajam, where the railway branches into two lines, one leading north to Bangkok and the other south to Ipoh, Kuala Lumpur and Singapore. The increased trackage has already been laid, and will take care of the congestion

that is expected when the port area begins to feel the traffic resulting from the opening of the deep-water wharves and warehouses.

At present, both ocean-going and coastwise steamers anchor in the roads between Penang and Prai and discharge their cargo into *tongkangs* whence it is taken either to Penang or Prai for re-shipment. The P. & O. wharf at Penang is the only one in the vicinity. When the railways' scheme is completed, liners may come alongside the docks and discharge directly into railway cars, or into warehouses which are also being erected.

The channel of the Prai river is being used for a basis of construction work. The river is being dredged to a depth of 30-ft. at dead low water for a distance of a mile from its mouth. The average width of the channel will be 500 feet, with an additional width opposite the docks, allowing room for vessels to turn without difficulty.

The new deep water docks are being built on the south bank at the mouth of the river. When finished they will afford 1,100 feet of wharfage, and will contain two godowns, each 475-ft. by 65-ft. Adjoining these docks are the present coastwise docks, 600 feet long, which are being widened and fitted with a godown of dimen-



CONSTRUCTION OF NEW WHARVES AT PRAI, BY THE F.M.S. RAILWAY DEPARTMENT

sions 375 by 65-ft. With the dredging completed, this wharfage will also be available for ocean-going shipping, giving in all 1,700 feet of deep-water docks for general shipping. Directly adjoining this dock, will be a coal wharf 900 long with full bunker accommodations. Both domestic coal from the Malayan collieries in Selangor, and imported coal for those ships desiring a different grade, will be available here.

Beyond the coal wharf is the present railway yard, with engine and carriage sheds, station, and jetty for the steam-launch service between Prai and Penang. Behind the yard will be built quarters for the additional European and Asiatic staff which the opening of the port will require.

Further down the river on the same bank is a large mangrove swamp which will be sufficiently reclaimed to provide a site for drydocks and slipways. The river will be dredged to this point to give access to these ways by large ships.

On the opposite side of the new wharf from the deep-water dockage, a lagoon will be dredged to a depth of 16 feet at low water, giving a harbor space of 300 by 1,100 feet. This lagoon will be given over to ships of light draft, and four 100-foot docks will be built at the south side. Behind these docks will be eight godowns, two to a dock, measuring 400 by 65 feet.

Behind the godowns, on land that will be made available by deviating the course of a small stream, there will be set aside one-acre blocks for factory sites, or sites for any other industrial purposes which may present themselves when the port is fully developed.

On the north bank at the mouth of the river 250,000 square yards of mangrove swamp will be reclaimed. No definite use has been yet assigned to the land which will be made available for this project, known as the Bagan Luar Reclamation.

The work on the Prai scheme was begun in May, 1918, and will be completed by the end of 1924. Some of the docks will be finished before the final date, and railway officials expect to have some deep-water wharfage, completely equipped with tracks and steam cranes, open to traffic by the end of next year.

The contract for the Prai wharves is in the hands of Messrs. Topham, Jones & Railton, Ltd., of London. Construction is being supervised by Messrs. Coode, Matthews, Fitzmaurice & Wilson, London, consulting engineers for the F.M.S. Railways, who are responsible for the plans and specifications.

The completion of the Prai docks will make two ports that the railways have built on the peninsula. The enterprise of the F.M.S. government made Port Swettenham, chief port for Selangor, into a port of entry taking care of 175 ships a year from Europe and America. The development of Port Swettenham is an accomplishment which would never have been undertaken by a private railroad company. From the standpoint of business, it would be more advantageous to have goods intended for the central Malay states landed at either Singapore or Penang, as the railroad haul would thus be longer and the freight charges considerably more. However, it was considered best for Selangor and the neighboring territory that there be a going port at the mouth of the Klang river, 25 miles from Kuala Lumpur.

Until 1899, Klang town was the port for Selangor, and coastwise shipping from Singapore and Penang used to come five miles up the river to a small dock which has since disappeared. In 1899 the F.M.S. Railways extended their Kuala Lumpur-Klang branch to Port Swettenham, and wharves were built to take care of the coast shipping which was diverted from Klang. In 1913 work was begun on a series of wharves which made Port Swettenham a deep-water harbor, and in 1918 the first ocean-going ship, a Ben Line steamer, came alongside the new docks.

Three small docks take care of the coastwise shipping at Port Swettenham to-day, and 2,000 feet of deep-water wharves, standing in 32 feet of water at dead low tide, accommodate the ocean-going ships. All docks are equipped with trackage and galvanised-iron

godowns, so that cargo may be either loaded directly into freight cars, or stored for future shipment.

Since facilities have been provided, imports from Europe come direct to Port Swettenham without transshipment. A service by the Blue Funnel Line brings shipments direct from the east coast of the United States, and occasional ships from Pacific ports come direct, but a good part of American cargo is still handled twice. The Blue Funnel ships are the most frequent callers at this F.M.S. harbor, P. & O. second, with the Ben Line and the Glen Line close behind. Beside the over-seas carriers, there is considerable Asiatic traffic, principally rice-boats from Rangoon and Bangkok which are regular and frequent callers.

Exports from Port Swettenham are almost entirely rubber and copra. Tin ore mined in the district is shipped to Singapore or Penang for smelting, and exported from these points. Imports range from needles to locomotive boilers. Everything that is consumed in the central Malay states comes through Port Swettenham. All the material for the F.M.S. Railways comes in here, including rolling stock. Much mining equipment is also unloaded for Selangor, Pahang and Lower Perak.

Mr. W. G. Stewart, assistant railway traffic manager in charge of Port Swettenham, is particularly proud of the harbor's facilities for handling heavy shipments. Railway regulations forbid the handling of anything weighing more than 20 tons, but no single pieces have ever come through weigh more than 15 tons. Mr. Stewart tells the story of the first American ship that called after the deep-water docks had been completed:

"She was bringing an American dredge for the Bentong Tin Mines in Pahang," says Mr. Stewart. "The skipper was a bit worried about getting the dredge off. He wanted a fortnight to discharge, as it had taken him nearly that to load it in San Francisco with a floating crane. He was considerably surprised when we had all the dredge parts on a train headed for Bentong at the end of five days."

The port is fortunately situated in regard to coastwise shipping, as coasters bound from Singapore to Penang or *vice versa* can put in and spend six or eight daylight hours at work without altering the time of their ultimate arrival had they been making a direct run.

Spending the day loading at Singapore, ships usually leave in the late afternoon. If they made the run continuously, they would arrive at Penang at midnight of the second day. That would have them loafing in the roads for six hours, awaiting daylight. Instead of doing this, they put in at Swettenham, which is overnight from either terminal port and only two miles off the direct course between them, and spend the extra hours loading and discharging whatever cargo they have for the central states.

Port Swettenham is a free port, charging only a pilotage fee. No wharfage is charged. Ships loading or discharging at the railway wharves are assessed 5 cents per picul on goods handled. The financial consideration makes the port a busy one on Sunday mornings. In Singapore and Penang no work can be done on Sundays without a permit from the governor of the Straits Settlements accompanied by a healthy fee. As no such regulation is in force in the F. M. S., ships make it a point to leave Penang or Singapore on a Saturday, and spend Sunday working at Port Swettenham.

Just what effect the opening of a deep-water port at Prai will have upon the traffic at Port Swettenham is a matter for speculation. Opinion seems to be that the Selangor port will retain the trade for the central states, while Prai will handle freight for Penang, Province Wellesly, Upper Perak, Kedah, Perlis, Kelantan, and Siam. A great effort will be made to stop Bangkok shipments at Prai and send them up by rail.

Meanwhile, railway officials even talk of improvements to be made at Port Swettenham in case traffic increases "when rubber and tin go up."

Conservancy Work in China

By Laurence Impey

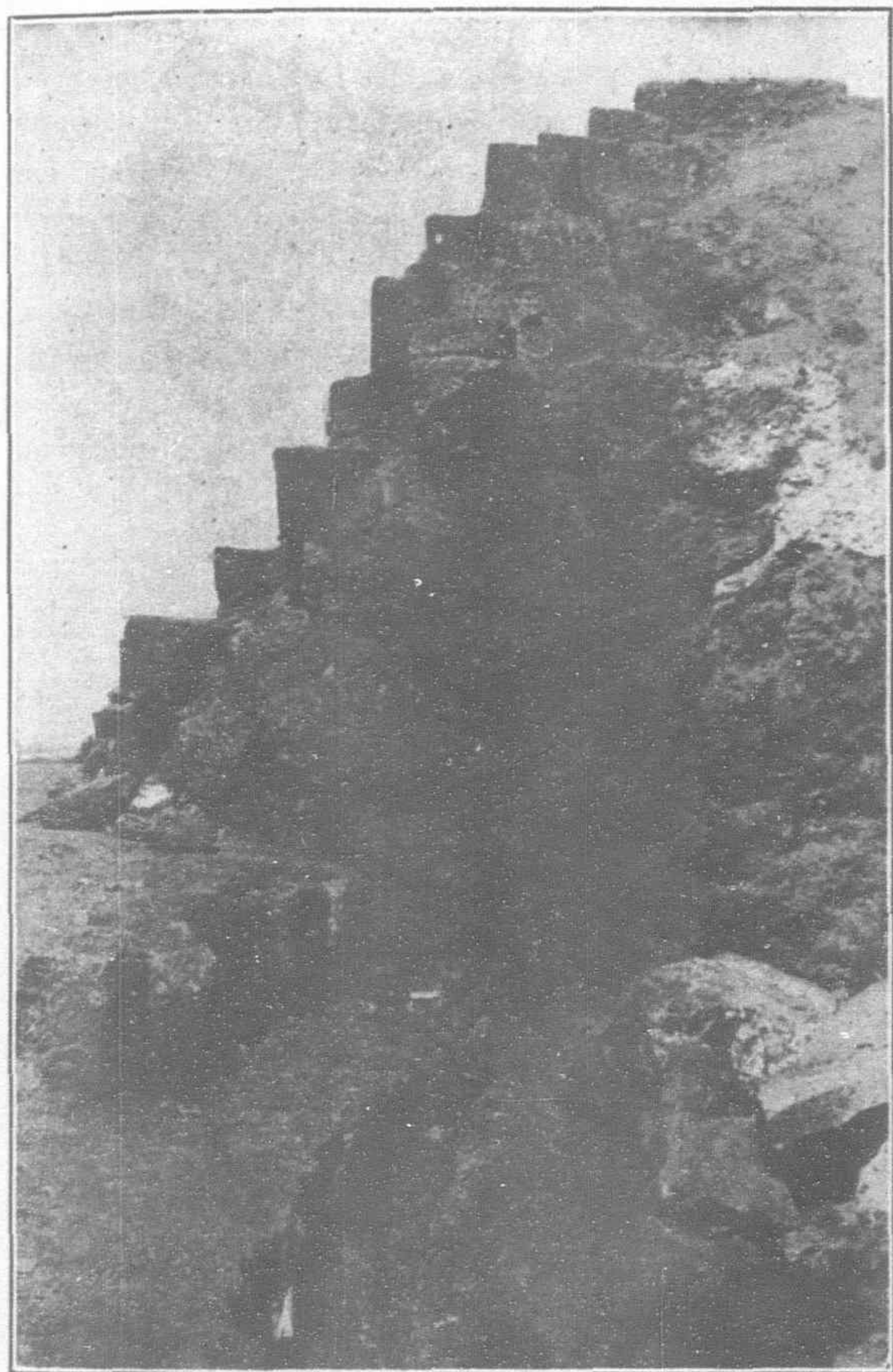
IN the course of our famine relief operations I had occasion to visit the city of Hsiang Yang, where we were carrying out some dyke repair work, and I think a short note on it may prove of interest.

I would like to refer first to an account of Siang Yang written by the famous Italian Marco Polo in the year 1295, when he committed to writing the history of his twenty old years sojourn in China.

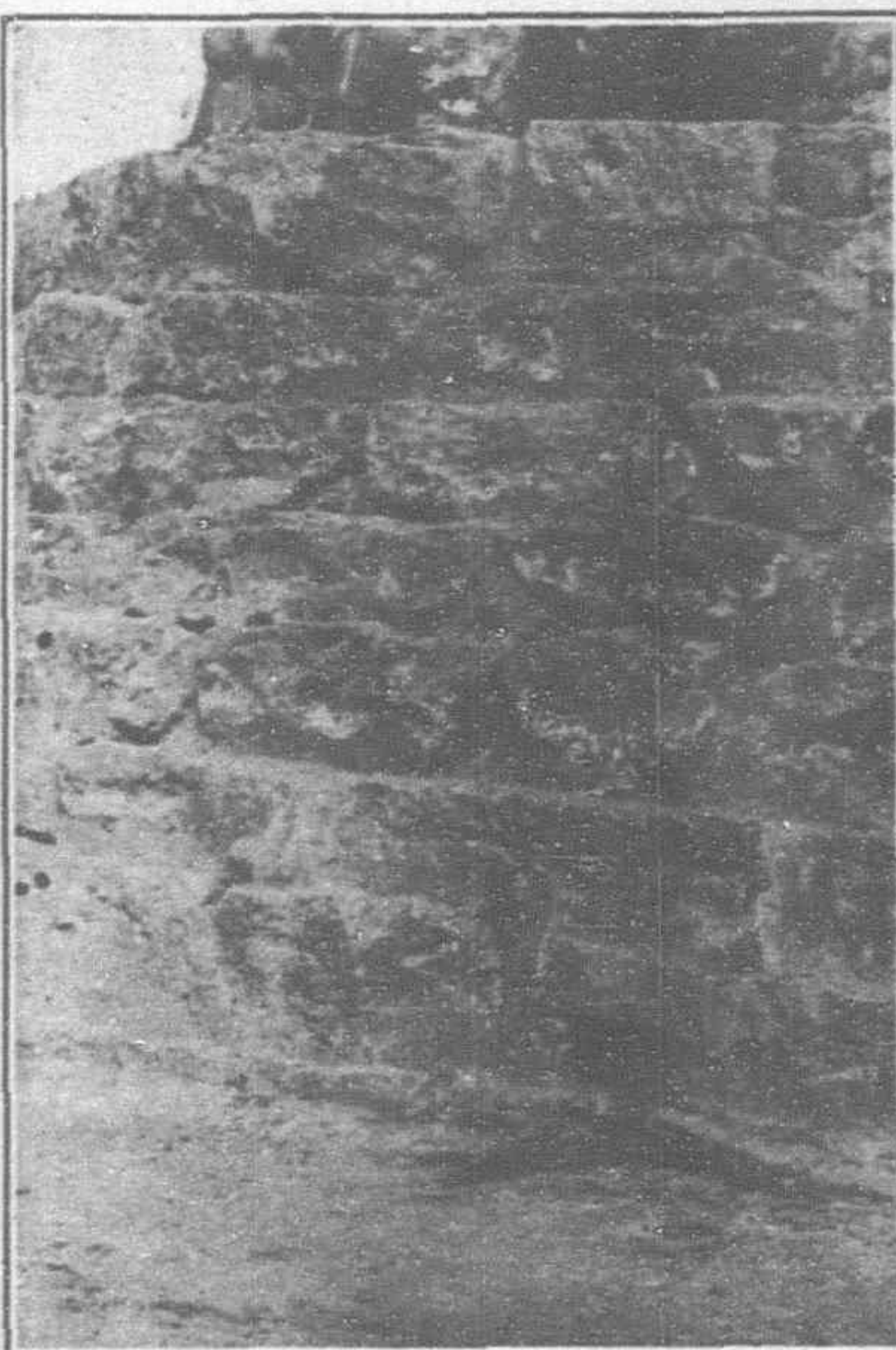
The first shot proved lucky, for it crashed into one of the principal temples with such violence as to destroy it, and bury many of the citizens in its ruins.

Terrified by this occurrence, which they attributed to the vengeance of the gods, the inhabitants made haste to sue for peace.

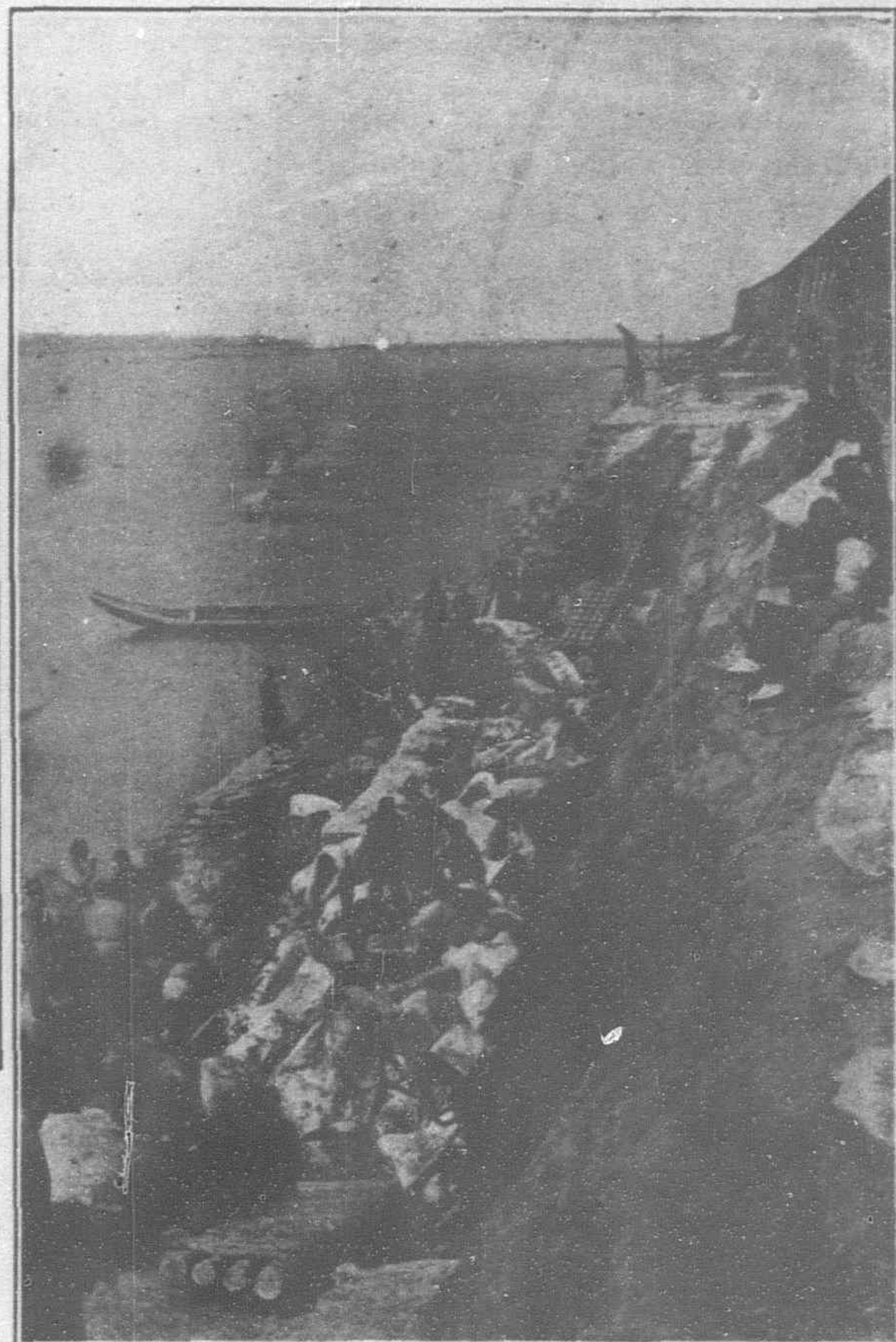
That this account is authentic there can be no doubt, both from the local legends, and from the constructive work shown even in the present day on the water front which we were repairing.



The Massive Stone River Wall Protecting the Ancient City of Hsiang Yang on the Han River



Face View of the Ancient Stone River Wall of the Han River at Hsiang Yang



Repairing the old Hsiang Yang River Protection. The Walls of the City fall sheer to the River

The emperor of the period was the famous Kublai Khan, who was then endeavoring to conquer the southern part of China, which was still in possession of the old Chinese Sung dynasty.

The city of Hsiang Yang was the key to the situation, and for four years it resisted all attacks.

Nicolo, the father of our historian, was then in residence at the imperial court, and he and his son approached the emperor and proposed to him the construction of 'mangonels' or stone-throwing machines such as were used by the Romans and other ancients in the siege of fortresses.

This proposal met with approval, the more so as all attacks on Hsiang Yang and its sister city across the river had proved useless.

With the aid of certain Nestorian Christians the machines were built and conveyed to the front by rafts, where they were prepared for action.

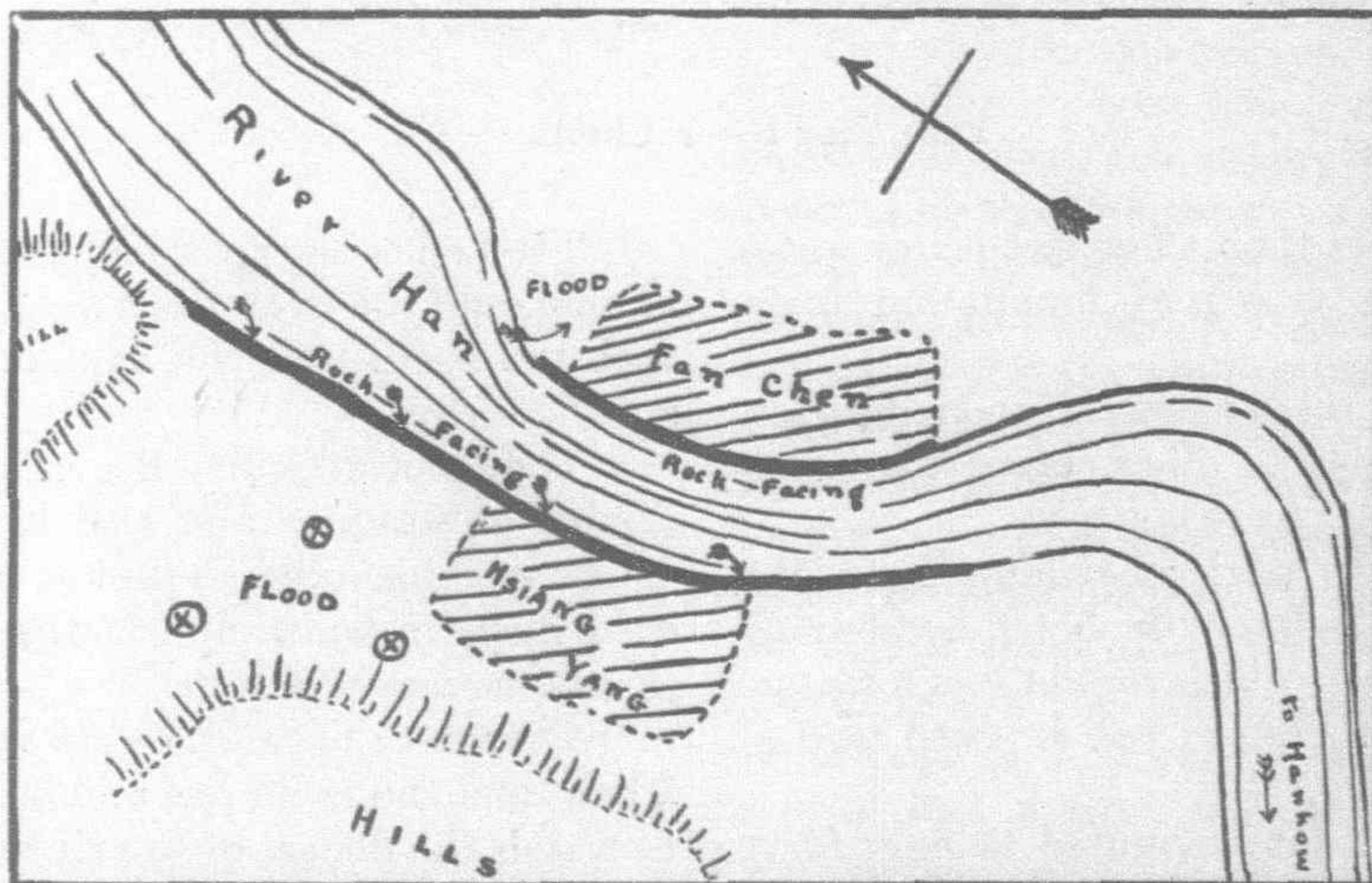
The rock facing is of the most massive nature, the blocks five and six feet in length, and the depth of the work some ten feet in many places, while the river frontage thus protected is over two miles.

Nor is it confined to one side of the river only, for the city of Fen Chen on the opposite side of the stream is similarly protected.

The sectional photo shows the damage done by the floods of last year, which had sufficient force to destroy the work of centuries, and hurl the masses of rocks across country or miles down stream.

The construction as carried out by local contractors under our direction presented some points of interest, notably in the form of cement used.

This grouting is composed of a mixture of lime, earth and a



Han River Conservancy Work at Hsiang Yang

rice soup, which is poured into the cracks and used as backing, and when dry appears to acquire an extraordinary solidity.

It will not set under water, but seems to be impervious to moisture when set, and is interesting moreover from the fact that it is the same compound as was used by the builders of hundreds of years ago, as far as one can judge.

The illustration shows the work in progress, with the walls of Hsiang Yang falling sheer to the river on the right, and the houses of the modern city of Fan Chen in the left background.

The blocks that we employed were of a fair size, as can be seen, but they were in no way comparable with those of the by-gone times, and it is an interesting comparison between the government of ancient days which was willing and able to devote millions of money to work of public welfare, and the feeble policy of the present day which has to rely on the efforts of outsiders in the shape of famine relief commissions.

Nowadays the city of Hsiang Yang is only the residence of the officials and some of the older gentry, the trade having all been transferred to Fan Chen, where they have the telephone, an aerated waterworks, and other inconveniences.

The river here is some six hundred yards wide, and the danger is due largely to this, as the channel above the cities has a breadth of over a mile, and the consequent constriction of flood water is very great.

The overflow has caused damage at the points indicated with an arrow, and at one time threatened to envelope the city of Fan Chen entirely, while some years ago it actually penetrated behind Hsiang Yang on the hill-slopes as marked by a cross.

It is curious that such an engineering construction should have arisen in some ways, for the builders of old time were fully as perspicacious as those of the present day, and must have foreseen the danger, but it appears that they estimated the risk as being worth it, for the native city of Hankow is placed in just such a position of jeopardy from the constricted area at the confluence of the rivers Han and Yangtze.

One point which I noticed during the construction work, and that was the apparently insecure foundations of this rock bunding, which did not penetrate more than a few feet below water level, and which has no excuse such as a rock foundation upon which to build.

Further experience showed that this is general upon the Han river, and the same may possibly apply to other conservancy construction in other parts of China which I have not seen.

With regard to the footings of the work at Hsiang Yang, the masonry was laid on wooden piles six inches in diameter, and having a penetration of upwards of fifteen feet, which should last for some years, as they are under water and therefore not exposed to destructive wear and tear.

The total cost of repairs carried out amounted to only forty thousand dollars, of which part was on loan, and part was represent-

ed by the materials, which were provided by the local and provincial officials on behalf of the authorities.

The Yung Ting Ho

The Yung Ting river has its sources in the province of Shansi, and passes thence through the Western Hills, under the shadow of which it runs with ever increasing velocity, gathering sand and gravel as it goes, until it emerges in the neighborhood of Peking at the famous Marco Polo bridge.

Owing to the fact that it is thus confined by hills, the conservancy officials make no attempt to handle the river until it reaches the vicinity of the bridge, and it was at this point that my own observations commenced.

The area covered by the board extends from Marco Polo bridge to the city of Tientsin, a distance of some three hundred *li* on each bank, and they organize the work as follows:—

There are four divisions, the upper north division, the lower north division, the upper south division, and the lower south division, located on the northern and southern banks of the river respectively.

The divisions are subdivided into sections, five to each division, giving them a length of some twenty *li* or more, a convenient unit of work to cover.

Each section has an engineer, an inspector and two assistants, while at No. 3 section in each division is the divisional engineer.

The head office is at the town of Liu Kow Chiao, near the Marco Polo bridge, and all the sections and divisions are in touch with headquarters by means of a private telephone, so that any danger can be reported immediately.

With regard to the nature of the work, stone facing of the dyke can only be done on No. 1 section of the upper southern and upper northern divisions, owing to the cost of transportation of stone from the quarries in the hills.

The rest of the facing is done in the following manner:—

Large branches of trees are cut, tied with rope at their butt ends, and suspended in the stream on the face of the bank.

Piles of *kaoliang*, tied in bundles, are laid on the river front, in layers five feet thick, and covered with a one-foot layer of earth, the whole being pinned down by twenty-five foot piles.

The bed of the river being shallow there is practically no undermining, and the dyke has a height of only some fifteen feet at most, with the result that this type of brush work seems to answer very satisfactorily.

The chief difficulty lies in the sandy nature of the soil, which cannot be tamped, and also in the fact that the river rises with extreme suddenness, so that at night it may have a channel a hundred yards in width and in the morning this may have swelled to three-quarters of a mile.

The width between dykes varies from half-a-mile to a mile and a half, and the rapid rise and fall of the stream renders it necessary to watch the doings of the river with particular care, in order that a few hours warning may be given at threatened points.



Yung Ting River, Chihli

The bed of the river lies some ten feet above the surrounding country, but I should suppose that the sedimentary and sandy nature of the flood tides renders the use of water gates for irrigation purposes impossible.

It appeared that the construction work was fairly well carried out, though I do not think that any full estimates of work required are prepared, the job that threatens danger being attended to as it comes along, and the materials in the various areas being bought more or less on speculation, as I observed that continued exposure to the weather had considerably deteriorated the quality of the ropes, *kaoliang*, brushwood, piles, etc.

It was not until I began to investigate the financial conditions and the personnel that I realized that I was indeed in China.

Each section has four on the staff, five sections to a division, plus the divisional engineer, yet the payroll for the whole division was only \$624 per month, an allowance of \$30 per engineer.

How can honesty and a straight policy be expected under these circumstances, for it is obvious that no one can live on such an allowance.

Then I found that each division carried a permanent laboring staff also, at a monthly rate of something under \$400.

This seemed a reasonable idea, until it transpired that there were two hundred and fifty on the payroll, an average of a little more than a dollar and a half per month.

It was explained that the men were allowed to go about their farming when not needed, and that when they were needed their food was provided on the job, and that they were supposed to have certain rights of cultivation of conservancy land.

This appears a most unsatisfactory system from a western point of view, as it renders it extremely difficult to check up expenditures, calls for a payment to unnecessary men at slack times, and does not cover the number required in an emergency.

The work is being done, and not neglected, as is the case on some other rivers, while when one considers that the staff is seven months in arrears of pay the honesty of the staff in carrying out their work is rather surprising and certainly very creditable to all concerned.

The Manila Railway Company

THE annual report for the year ending December 31st, 1921, shows a total length of road in operation of 1,031,549 kilometres (of which 13,586 is double track) with 21.99 kilometres under construction. The equipment shows 35 passenger, 49 freight and 71 combination locomotives, a total of 155, with 197 passenger coaches and 52 baggage and express cars, and a total of 1,831 freight cars of all classes.

The income account statement for the year is as follows:

	Year 1920. Pesos	Year 1921. Pesos
Operating Income		
Railway operating revenues:		
Transportation—rail line ..	11,568,011.95	11,978,509.32
Transportation—water line ..	267,294.73	192,484.52
Incidental	131,093.82	103,304.85
Non-operating Income		
Hire of freight cars	1,713.92	1,566.57
Rent from locomotives	2,251.00	484.25
Rent from lease of road	—	—
Miscellaneous rent income	8,219.65	3,577.72
Dividend income	—	—
Income from funded securities	4,337.00	2,190.88
Income from unfunded securities	327,658.11	203,178.27
Miscellaneous income	6,385.75	2,976.27
Total	12,316,992.93	12,488,272.65
Operating Expenses		
Railway operating expenses:		
Maintenance of way and structures	2,160,627.13	2,013,172.54
Maintenance of equipment	838,815.34	1,085,923.78
Depreciation of equipment	349,875.88	393,887.95
Traffic	39,444.16	48,270.23
Transportation—rail line	5,738,660.09	5,217,868.59
Transportation—water line	289,954.96	280,672.85
General	507,569.41	632,513.80
General	507,569.41	632,513.08
Transportation for investment	(58,830.48)	(165,502.62)
Other railway operating expenses:		
Railway tax accruals	8,078.36	—
Uncollectible railway revenues	126.37	262.85

	Year 1920. Pesos	Year 1921. Pesos
Deduction from Gross Income		
Hire of freight cars	—	103.95
Interest on funded debt	2,430,800.00	2,572,877.38
Interest on unfunded debt	68,000.77	140,839.80
Income applied to sinking and other reserve fund	4,488.00	4,488.00
Total	12,377,609.99	12,225,379.10

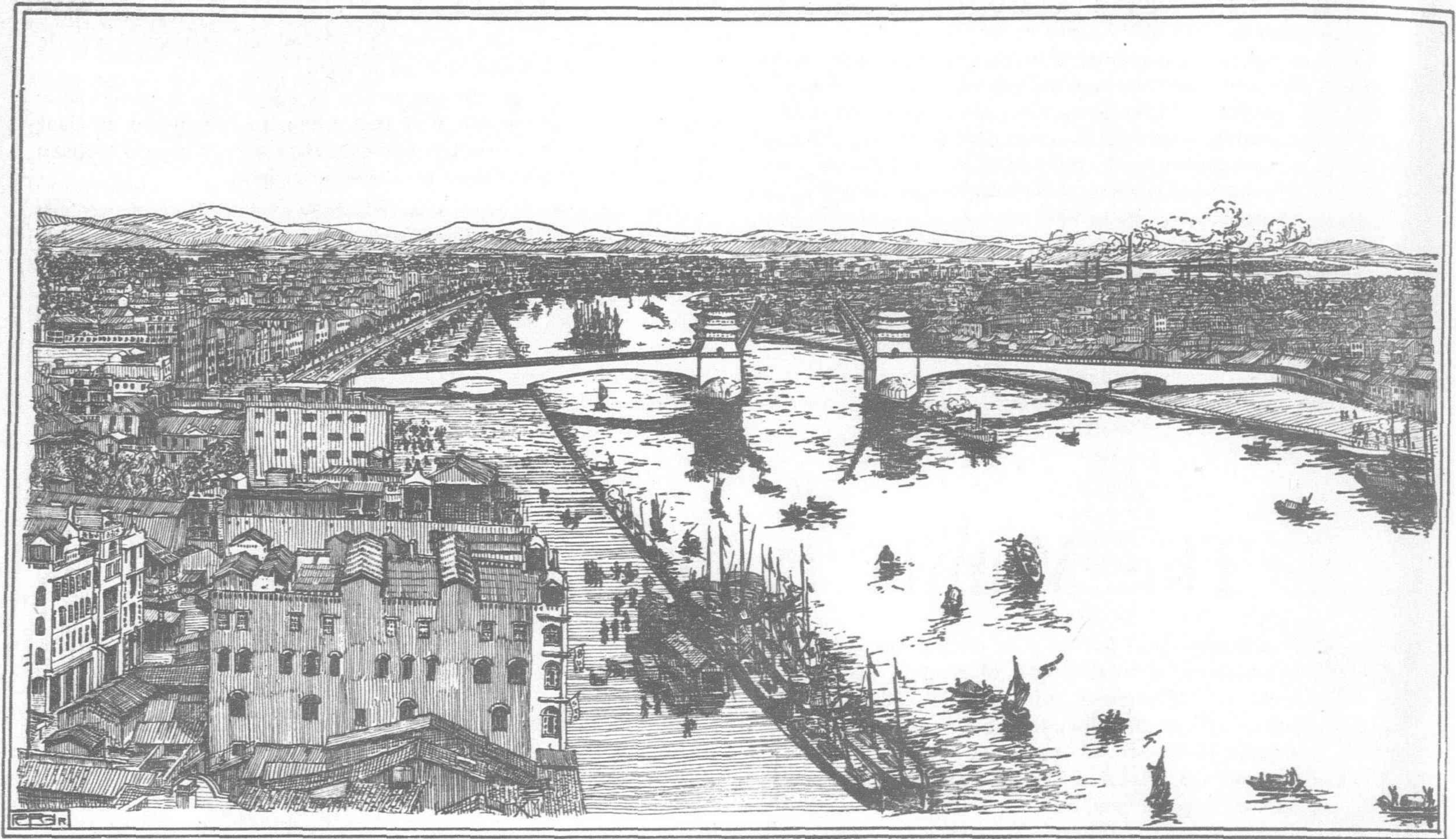
Balance transferred to profit and loss (60,617.06) 262,893.55
Express receipts declined slightly due to financial stringency and the loss of business to auto-trucks on short hauls. Train messenger service established during 1919 is becoming more efficient and attractive to shippers.

The directors recommend that the express service be expanded and made to cover C. O. D. business which will facilitate provincial producers in reaching the larger markets as well as increase the distribution of manufactured articles. The possibility of establishing delivery trucks in the Manila district should also receive careful consideration.

The opening of the Ragay gulf route following the completion of the rail lines from Calauag to Aloneros and from Naga to Pamplona during the latter part of 1921, and placing the steamship *Borongan* in operation between Aloneros and Pasacao will undoubtedly prove attractive, especially to the Bicol provinces. A through passenger, freight and express service is being maintained and is proving beneficial to the Legaspi division earnings.

The train service between Noveleta and San Roque, province of Cavite having been abandoned under legislative authority, and the rails removed, an auto-truck service was established, owned and operated by this Company. The first truck was placed in operation during March, 1921, and another truck was added during May. The trucks to the end of December handled 49,170 passengers with receipts of P.9,834 and expenses of P.10,212.98 which does not include depreciation and interest on the investment. The present rate of fare is 20 centavos which should be increased.

Auto-truck competition has increased at an alarming rate during the year, especially in the districts adjacent to Manila. The lack of supervision over auto trucks by the public utility commission makes the competition extremely severe and this competition can be met only by reducing the fares or providing more frequent and cheaper railroad transportation. This can probably be accomplished by installing on designated rail lines motor propelled coaches.



Proposed Bridge Across the Pearl River

THE following project for a bridge to connect Canton city proper with Honam island has been worked out in connection with a plan for improving the front reach in the Pearl river by Major G. W. Olivecrona, engineer-in-chief to the board of conservancy works of Kwangtung.

The question as to whether this bridge should be constructed as a high-level one providing clearance for vessels with masts, or as one of low-level with a movable span, has been discussed for some time by the public as well as in engineering circles. A low-level bridge with a bascule span has been considered to be the most suitable type in this case for the following reasons:—

1. The future extension of the Canton harbor will follow the shores of the back reach where deep water is to be found. Ocean-going masted vessels which can enter the harbor only through this reach will, with very few exceptions, moor here and never have to pass the bridge.
2. The approaches to the bridge would be limited each to 232 m. in length as compared with a length of 580 m. respectively, if a high-level bridge were chosen. The low bridge would, therefore, avoid the occupation of valuable private land, as the approaches could be laid out on ground reclaimed from the river.
3. The bridge would have a free height at high water level of 14 m. under the bascule span and would thus permit local river steamers, tugboats and all smaller craft to pass without necessitating the opening of the bascules.

4. A low-level bridge of heavy substantial structure, built of reinforced concrete would be more in keeping with the surroundings, compared with a high-level bridge which would have to be constructed of iron trusses, built to a height of about 27 m. above H.W.L.

5. A low-level bridge constructed of reinforced concrete for which all materials, with the exception of the movable span, could be obtained locally, would eliminate the necessity of buying expensive materials from abroad.

Those who oppose the construction of a low-level bridge argue that the movable span when in operation would put a complete stop to all traffic over the bridge. This is of course true, but if the periods for the opening of the bascules should be selected during the nights and early mornings when the flow of traffic is at its lowest, the inconvenience would not be much felt. With modern construction and appropriate machinery, the time for opening or closing the leaves would only cover a period of a few minutes.

The specifications for the bridge have been proposed as follows: Number of spans three, two of which are to be stationary, and to have a free opening of 59 m. from pier to shore and a height in the centre of 11 m. at H.W.L. The third span is to be movable in accordance with the bascule type, with a free opening of 45 m. between the central supporting piers, and a height in the centre of 14 m. at H.W.L. The width of the bridge between side railings should be 18 m. The price has been estimated to cost H.K. \$2,160,000. This includes the cost for the deepening of the river at the selected site for the bridge.

Kitchen's Reversing Rudders

IT is a remarkable fact that with all the wonderful scientific improvements which have been embodied in the construction of the modern power-driven ship, the type of rudder in use to-day is practically the same as in the days of the Vikings. It is true that inventors have from time to time evolved various forms of ships' rudders, with the object of improving the steering and manoeuvring capacity of the ship, and some have also aimed at obtaining a braking effect by means of the rudder, but the only invention which so far has proven itself a success and has completely satisfied commercial requirements, is the ingenious rudder designed and patented by Mr. J. G. Kitchen, of Lancaster, England.

This invention gives all the advantages previously sought for, with the important addition of the power of bringing the vessel to a dead stop or of reversing the direction of the course without altering the speed or direction of the engine or propeller. In other words, Kitchen's reversing rudder is capable of manoeuvring and reversing the direction of a ship from the bridge, without reference to engine-room. This is a most important safety factor and should appeal to

all practical men, as it will have an important bearing upon future navigation. It is also most important to remember that the control of the helm is in exactly the same way as with an ordinary rudder by steering wheel or tiller and that therefore the present invention is not likely to create any confusion in the wheel-house. A separate and independent hand wheel is provided

by means of which all speed variations and reversing is carried out.

This wheel corresponds to the operation of the old-fashioned gong and jingle or bridge to engine-room telegraph with the very important difference that with Kitchen's rudder immediate and direct action is obtained whereas in the other the older from only indirect and much delayed action is obtained a delay which might result in serious consequences.

The action of Kitchen's reversing rudder is such that the direction of thrust never changes, whether the vessel is going ahead or astern, consequently the excessive vibrations and wear and tear, which are unavoidable under ordinary conditions of reversing, disappear entirely when Kitchen's reversing rudder is used.

The essential parts consist of two curved deflectors which partly enclose the propeller. Both deflectors are pivoted at the top and bottom on common centres. One of the deflectors is operated by a solid shaft, and the other by a hollow shaft concentric with the solid shaft. By simple mechanism the deflectors or rudders are made to turn together in the same direction, or equally in opposite directions.

The diagrams show that this rudder gives at all times direct and instantaneous control of the speed and course of the vessel.

The engines continue to run at full speed ahead or at their most economical speed while the vessel slows down, stops, goes astern or carries out any other manoeuvre required in an emergency or in the ordinary course of navigation.

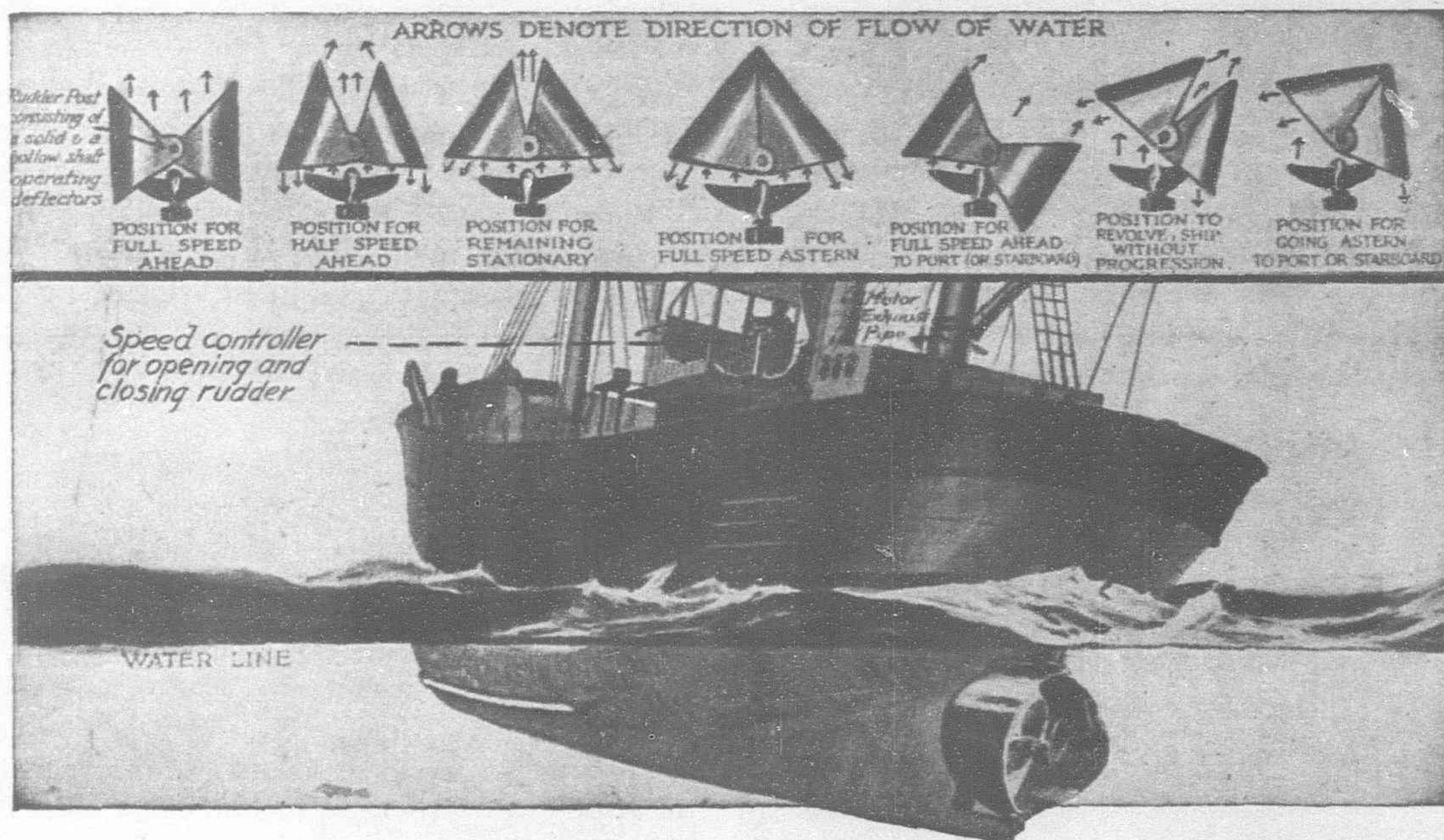
It has been found that a vessel can be turned on its own centre without proceeding either ahead or astern and when going full speed ahead can be stopped in approximately its own length the time taken depending partly on the rapidity with which the rudder is closed and partly on the ratio of power to displacement.

The rudder is applicable to all classes of vessels single of twin-screw and is controlled either by lever, tiller or steering wheel. An indicator is provided showing position of the rudders for speed variations. For large installations it is necessary to introduce power for the steering and operating of the rudders and power operated gears and controls have been designed for either steam, hydraulic or electric.

The Kitchen's reversing rudder was recently fitted to the Spanish coasting vessel the *Alca*, a steel vessel of 500 tons' displacement, 140-ft. long, 22-ft. 5-in. beam and 10-ft. moulded depth

fitted with 150 B.H.P. Sulzer Diesel engines but without reversing gear or clutch devices of any kind. The propeller of the vessel is 4-ft. in diameter.

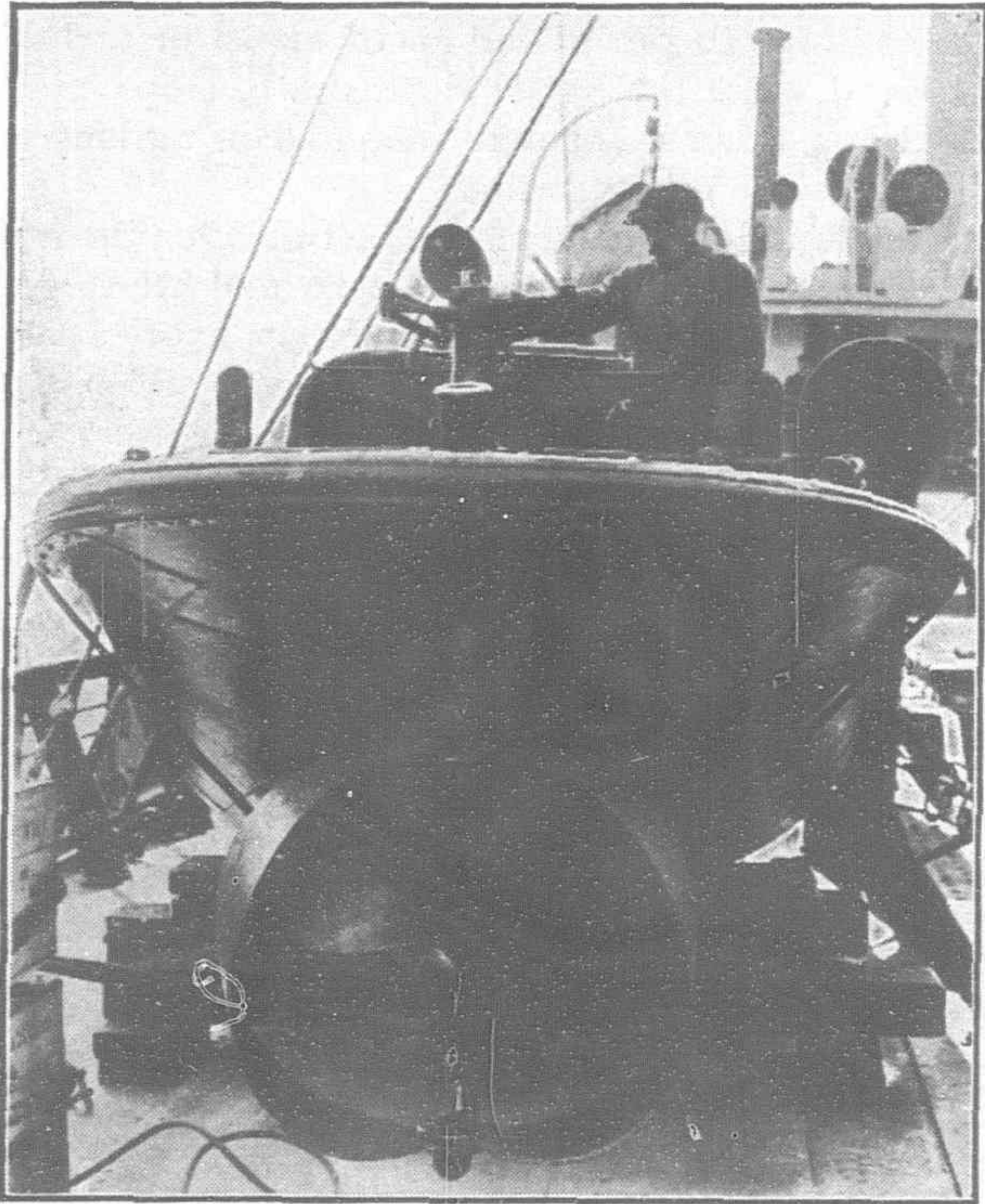
The opening and closing of the rudder and consequently all speed variations and reversing are regulated from the control hand wheel placed in wheel-house and these operations are, of course, quite independent from the control of the



helm which is as with on ordinary rudder maintained by steering wheel. The time taken to bring the vessel from full speed ahead to dead stop is 34 seconds and the distance traveled 200-ft. The diameter of her turning circle at full speed ahead was 140-ft. as the time taken to spin about an axis amidships through a half circle was 1 minute 25 seconds. Although the sea speed of the vessel is only 6½ knots the control proved very efficient and rapid in operation and the boat performed complicated manoeuvres with ease.

With the growing demand for internal combustion engines for marine propulsion many difficulties have to be overcome arising out of the high speed of these engines. The problem of slow running and quick and efficient reversing have for a considerable time been engaging the attention of experts as it is generally accepted that reversing directly by the engine or by reversing gear is mechanically objectionable causing abnormal shocks and stresses in the machinery and to the structure of the vessel, excessive vibration and consequently heavy wear and tear on hull and machinery. This difficulty is entirely overcome by Kitchen's reversing rudder, as no reversing gear or clutch of any kind need be fitted. One man can easily run and control the ordinary motor boat because when once the engines have been started he need not leave the steering wheel, but can obtain all speed variations or reverse the course of

the boat, by means of a control wheel within easy reach giving immediate and direct action on the rudder. This means, of course,



improved engine efficiency and economy, reduced wear and tear on hull and machinery, and improved steering and manoeuvring qualities.

A further very important factor is also the protection this rudder affords to the propellers and the saving in machinery space

as no reversing gear is required. The machinery need only consist of engines, shafting, thrust bearing and propeller, the latter being solidly connected with the engine.

It is often necessary, as for instance, with trawlers and fishing boats to maintain a slow but efficient speed and it is not practicable to slow down on oil engine sufficiently.

With Kitchen's rudder the speed of the boat may be controlled and regulated from the steering position to a fraction of a knot with the engines running at their most economical or lowest reliable speed. The rudders also afford complete protection to the nets from any entanglement with the propeller. It is of very great value with oil engines to be able to run them for long periods at a constant speed thereby reducing to a minimum engine trouble and breakdowns.

The Kitchen's reversing rudder shows to best advantage when applied to tugs and canal boats when quick response to the helm combined with perfect and instantaneous control of speed reduces to a minimum all dangers of manoeuvring in congested waterways and avoids any sudden pull on the tow rope which might cause breakage. The power may be accelerated from rest as gradually as may be desired allowing the vessel to proceed at the lowest possible speed and to remain under perfect control all the time.

The Kitchen reversing rudder has also proved itself very successful in launches used on the west coast of Africa where inexperienced native labor has to be employed for running these launches with the result that prior to fitting Kitchen's reversing rudders the wear and tear on the engine and reversing gear were excessive owing to lack of skill on the part of the natives.

Since Kitchen's reversing rudder has been accepted the native engineer's duty practically resolves itself to keeping his engine running at a constant speed in one direction while the steersman has complete control of the speed and manoeuvring of the boat independently of the engine.

Peking Electric Tramway

(SCHEDULE OF PROGRESS OF WORK FOR 1922-1923)

From the time the Company was organized to August 1922, the following work has been done:—Survey of lines. Completion of drawings of lines.

Contracts for purchase of materials.

First payment of contract. Call for tenders of power station, converter station, car-shed and repair shop buildings. Testing of reinforced concrete trolley poles.

From August 15 to 30.—Construction of poles. Testing of water source for power station.

From September 1 to 30.—Arrival of boiler and principal machinery foundation plans. Opening of tenders of power station, converter station, car-shed and repair shop buildings. Call for tenders of ballast for road bed. Construction of car body (at Company's shop).

October 1.—Construction of power station, converter station, car-shed and repair shop building begin. Opening of tenders of ballast. Erection of trolley poles begins.

October 30.—Arrival of first lot of 1,100 tons steel rail.

November 1.—Transportation of ballast begins.

November 30.—Second lot of 1,600 tons steel rail arrive.

December 1.—Machine shop equipment arrive.

December 15.—Construction of building stops.

December 31.—Forge shop equipments arrive. Crane and miscellaneous equipment arrive. Boilers and parts of electric machinery arrive. Preparation of traffic regulations.

January 15, 1923.—Paint shop equipments arrive.

February 1.—Training of motormen. Upper frames of truck arrive. Laying of track begin.

March 1.—Building construction resumed.

March 15.—Complete arrival of boilers and electric machinery and accessories. Erection of boiler and piping begins. Part of truck shipment arrive. Assembling of car body and truck begins.

March 31.—Erection of turbine started. Remaining portion of steel received.

April 15.—Erection and connection of switchboard. Winding shop equipment arrive. Repair shop transmission and shafting arrive. Erection of repair shop machinery. Trolley wires arrive.

May 1.—Transformers and accessories arrive. Erection of converters. Stringing of wires started.

May 15.—Delivery of truck completed.

May 31.—Erection of poles and car bodies finished.

June 30.—Construction of power station, car-shed buildings finished. Track laying finished.

TRAMWAYS FOR KOWLOON. A correspondent at Hongkong of "The Times Trade Supplement" writes: The government appear to have decided to sanction the construction of tramways in Kowloon. To begin with about seven or eight miles of track will be laid, but Kowloon is spreading so rapidly that it will not be long before there will be twenty to thirty miles of track once a beginning is made. The plan favored at present is that of leasing the concession. Whatever arrangements are made, one result will be more work for British engineering firms.

The Far Eastern Review

A Monthly Review of Far Eastern Trade, Finance and Engineering, Dedicated to the Industrial Development and advancement of Trade in Far Eastern Countries

ENGINEERING FINANCE COMMERCE

5 JINKEE ROAD, SHANGHAI, CHINA

Telegraphic Address: Farview, Shanghai

SHANGHAI, SEPTEMBER, 1922.

Facing the Facts

"If the Chinese government without aid from the outside could not or would not save China, then the great powers in common would be compelled to take united action to aid in saving her. With an anarchic or impotent China before them the powers could not pass by on the other side. That was too vast a menace, not only to their own interests, but to the peace of the world."

(From Minister Schurman's Speech at Peking, September, 1921)

THE Chinese people need a friend. Their government is defunct. Anarchy reigns throughout the provinces. There is no responsible head to any ministry. One man stands at his post fighting the inevitable. The minister of foreign affairs still officiates, receiving protests, complaints, demands, bills and abuse from the diplomats of all other nations.

The fears expressed by pessimists have come true. China has refused to put her house in order. She has failed to abolish civil strife

and develop a stable and effective government acceptable to her own people as well as foreign nations. She stands a menace to herself, to her neighbors and the peace of the world. Her weakness and disorganization has permitted the Soviet to establish its rule in Mongolia and her scholars are now sitting at the feet of the high priest of Bolshevism addressing him as "Master." Her failure to meet the interest and principal on outstanding loans has destroyed her credit abroad. Her refusal to pay legitimate bills to private merchants for materials ordered and delivered threatens the stability of many of the largest foreign concerns in China.

The Peking government has lost the confidence of its own bankers and investors, closing the door to any further assistance from within. It has played false to its friends and hypothecated over and over again revenues previously set aside for the service of other loans. The salt surplus is but a tradition, and it is said that the gabelle faces a deficit of over \$2,000,000 for the current month. Peking officials have defaulted, absconded, forged and stolen in order to keep the gang of militarists in power. They have printed unauthorized

domestic loan bonds and sold them to an unsuspecting public. Not content with fleecing their own people they have attempted to swindle the foreigner by using these forged notes as security for advances. In one instance, the vice-minister of finance actually succeeded in raising \$400,000 from a foreign bank on the security of \$575,000 worth of these spurious bonds. Luckily, the manager of the bank had the wit to make an immediate investigation and discovering that the numbers on the bonds were unauthorized, stopped payment on the compradore order. It had been already cashed at a native bank.

Story after story is told of other lapses from official honesty on the part of Peking job-holders forced into crime in order to satisfy the greed of their military overlords, or, in many cases, to fill their own pockets while the filling was good. The foreigner has been milked, bilked, stung and trimmed at every turn. Over two hundred thousand dollars in squeeze were extracted in one painless operation from foreign firms in Peking in exchange for forged orders for railway materials placed through a foreign bank, which were at once repudiated by the managing director of the railway concerned. The Peking mandarins have stooped to trafficking in human misery, appropriating relief funds contributed by foreign charity for feeding the starving millions of the North. Roads built from the proceeds of these famine funds are now impassible. The millions expended upon their construction have been wasted. All loans not secured upon the customs and salt revenues may be said to be worthless, a charge upon the good faith and integrity of the Chinese people.

Aside altogether from the many defaulted foreign and domestic loans there exist the more immediate debts owed to foreign mercantile firms in China who are hard pressed to meet their obligations through the refusal of the Chinese authorities to pay up or even consider the matter of issuing bonds or treasury notes that could be used to satisfy the carrying banks. Millions of dollars' worth of materials have been delivered in fulfillment of official contracts, and as many more millions' worth of materials are piled up

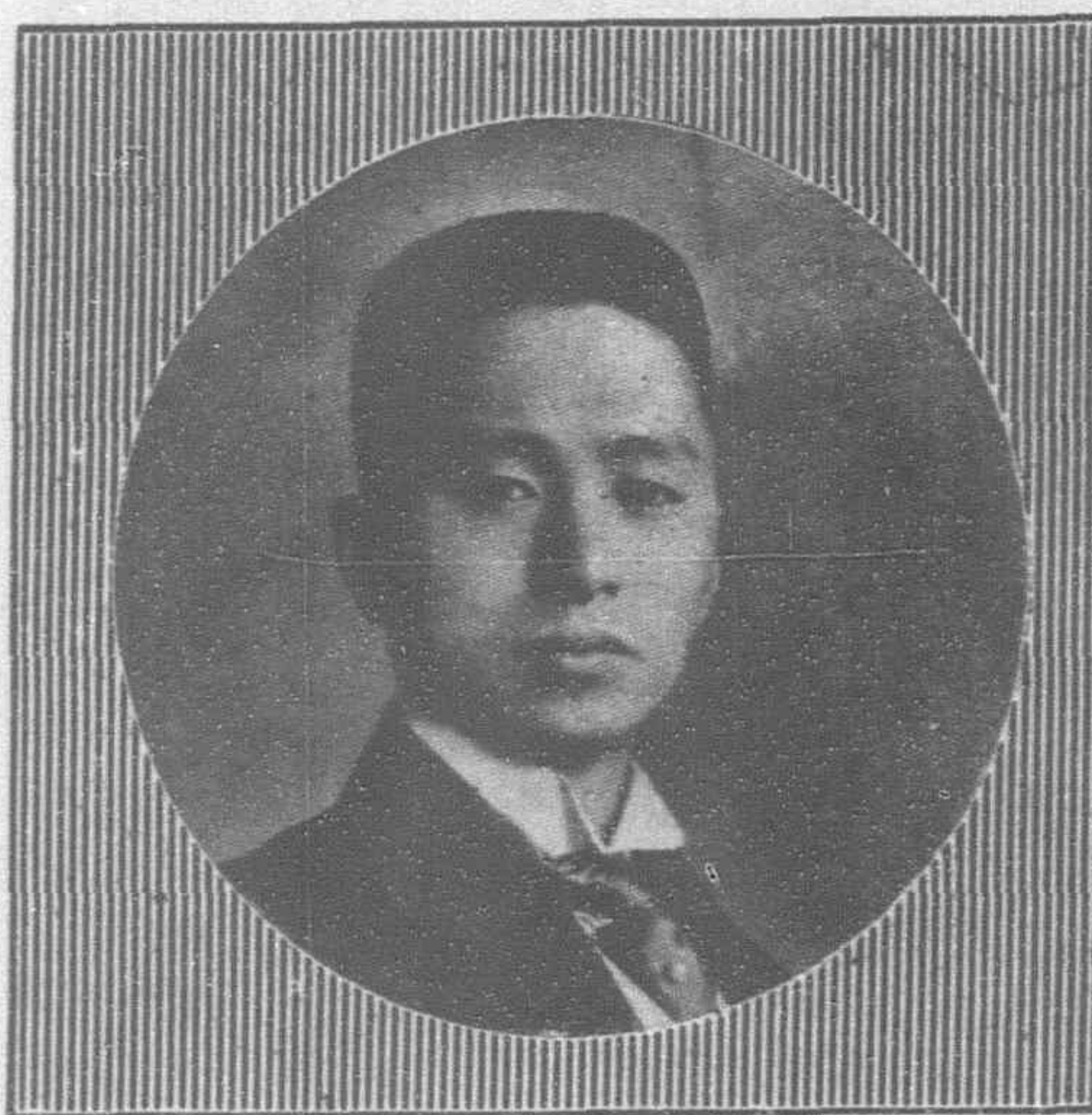
at the ports awaiting payment and acceptance. Large orders have been placed by official intermediaries, the squeeze collected, and on the arrival of the cargo, the intermediary has disappeared, and the officials have repudiated the contract. A list of the foreign firms who have been hit the hardest would embrace many of the most important hongts in China. Owing to a natural disinclination to court publicity, it is difficult to make an accurate estimate of the amounts due to these con-

cerns, but it is safe to state that not less than \$40,000,000 is involved. Some of these accounts for railway materials run as high as ten million each. Shipments ordered last year are piled up at the ports where the firms who executed the orders have been compelled to rent land for storage purposes and surround it with armed guards.

Unless these unsecured debts are paid within a reasonable time, foreign firms in China can prepare for another catastrophe before which the crash of 1920 will appear insignificant. The market has never recovered from that break, and another blow at this time may precipitate the failure of firms who have gallantly weathered the



Dr. Wang Chung-hui, Acting Premier of the Chinese Government



Dr. Wellington Koo, China's Minister of Foreign Affairs

In the darkest hour of China's financial troubles, the burden of staving off bankruptcy is thrown on the shoulders of these leaders of the Young China party.

storm relying on the traditional honor of the Chinese to pay their accounts in full. When, two years ago, the Nishihara loans to the extent of over \$200,000,000 were repudiated by Peking, the anti-Japanese element applauded this act as highly patriotic, evidence that China still possessed considerable virility and courage. China was being taught how easy it could be done, and to-day the shoe is on the other foot. The other fellow's ox has been gored, and American and British firms are paying the penalty for their blind faith in the *bona-fides* of the Peking mandarin.

As far as this pertains to American firms, we hold to the conviction that they are not solely to blame. The fault lies with those responsible for initiating the campaign that induced American firms to rush into the new commercial *eldorado* in order to capture the trade by sheer weight of numbers. It is necessary at this time to emphasize these activities, as they constitute a precedent that compromises the American government to take effective steps to protect the interests of those who accepted its advice. There was a time, under a previous administration, when appealed to for protection to American lives and properties in Mexico, a secretary of state could safely answer: "The American government has many more important matters to attend to than bothering about Americans who could not make a living in their own country." Americans were not officially invited to colonize, develop and invest in Mexico, or other countries. They were officially urged to come to China. The American government therefore cannot escape its responsibility. The present administration must accept the obligations imposed upon it by the policy of its predecessor, and stand firmly behind its traders who entered the Chinese field and extended credit to a government they were taught to believe could "pay spot cash for everything it purchased, if it so desired."

If American firms are forced into bankruptcy by reason of the failure of the Chinese government to pay its debts for merchandise and materials, or because of its unwillingness to issue notes in order to enable its creditors to seek relief from the carrying banks, the effect upon China will be disastrous. The loss of American sympathy, support and credit may well lead to foreign intervention in the collection of China's revenues, at least, such of these as may be most readily collectable. Americans have learned well their lesson, but we repeat, the government must stand its full share of the responsibility and exert itself by taking active steps in initiating some measure that will bring order out of chaos and stability out of insolvency. Aside altogether from the more important phases of the political situation, it owes that much to its own nationals. It also owes something to the other powers, who have accepted the Hay doctrine and refrained from collecting their own debts in the usual manner. It is hardly to be expected that other nations will willingly accept the extension of the Monroe doctrine to China, which has protected defaulting South American states against occupation by the armed forces of powers whose subjects have been openly robbed by unscrupulous military dictators. The time must arrive when the American government must either take the initiative in proposing some way out of the Chinese muddle, or step aside while other powers bring their own pressure to bear upon China for the collection of legitimate debts.

The present situation is intolerable. If China is permitted to dawdle along and solve her problems in her own way and in her own good time, without the offer of a helping hand, the chances are that the existing chaos and anarchy will in time equal, if not surpass, the debacle in Russia. As Minister Schurman concisely put it, "an anarchic and impotent China is a menace to the peace of the world," something that the other powers in self-defense could not pass by. Especially is this true in so far as her immediate neighbors, Japan, Great Britain and France are concerned. They would be the first sufferers from the spread of anarchy in Asia. From her safe distance America can afford to view these matters from a detached and altruistic standpoint. The conflagration is not likely to disturb the even tenor of American life and prosperity. The

other powers, however, are in a dangerous position and sooner or later must act to protect their interests.

The time has therefore arrived when America must shoulder the responsibilities imposed upon her by the Hay doctrine and the treaties arising out of the Washington conference, and as the friend of China, take the initiative in placing into practice the doctrines she has advocated and upheld for the past two decades. It may mean the calling of another conference, the arriving at another international understanding that will give effect to the Washington treaties and preserve China for the Chinese, insure the peace of Asia, of the Pacific, and of the world. For just so sure as China is permitted and encouraged to drift into further chaos and bankruptcy, a situation will arise calling for energetic action by some individual power whose own vital policies will be jeopardized by such conditions, and then international co-operation in a military sense will be precipitated on a large scale in order to avoid the re-establishment of the spheres of interest.

Unless the American people are willing to participate in a military occupation of China they must be prepared to throw overboard their traditional policy of the "open door" and accept the temporary impairment of China's administrative independence by other powers until such time as their just debts are collected. At all events, unless the Chinese unaided overthrow the rule of the *tuchuns* and establish a government satisfactory to themselves and the other nations, the American people must face the possibility of eventual participation in an armed occupation of the principal interior cities of China as the only safe guaranty that the country can again be placed on its feet as a going concern. It is to be hoped, however, that before such a drastic solution to present anarchic conditions is discussed seriously by the powers, that the Chinese, recognizing their own impotence, will of their own accord, invite such friendly foreign co-operation in order to enable a stable government to impose its will upon the gang of military freebooters who now hold the people at their mercy, and so permit the collection of revenues without which no central government can function and discharge its international obligations. That the situation is gradually drifting towards the imposition of a receivership over China's revenues is a fact patent to all impartial observers. Unless the Peking government is able to meet its mid-autumn obligations, an official announcement of bankruptcy cannot be long delayed.

What is the solution? The answer to this question is unanimous. An "international debt commission," "international financial control," "a receivership," "foreign audit and supervision over the collection of revenues"; they all mean the same thing. How is it to be brought about? Ask the average observer in Peking and he will wring his hands and admit the difficulty of applying the remedy. The impression gained after interviewing the wise ones in Peking, is that no foreigner dares to incur the enmity of the Chinese by openly advocating a solution they all privately admit is inevitable.

Foreign sentiment in Peking is swayed by its environment; the news that emanates from the press bureaus is ninety per cent. pure propaganda. To a man, foreigners in Peking look up to Wu Pei-fu as the savior of China, closing their eyes to the fact that his power is derived from pocketing state revenues to an amount estimated at anywhere between \$25,000,000 to \$50,000,000. In addition, he is charged with extorting over \$10,000,000 in the past year, through forced levies on the people of the provinces under his control. The "Hope of China" has materially contributed to plunging the government into bankruptcy, yet the Peking clique defends these peculations, while villifying Chang Tso-lin, Sun Yat-sen and other *tuchuns* for resorting to the same practices. On the other hand, foreigners in Manchuria swear by Chang Tso-lin and while Sun Yat-sen was in power at Canton the verdict was unanimous that his rule was most liberal and beneficent. Wu Pei-fu has had the advantage of being closest to the news centre and of having several newspaper correspondents on his staff of advisers.

Nothing matters to this group but Wu Pei-fu. The interests of China and of their own countries, are subordinated to its personal hopes and aspirations. It selected Wu to take the place of Li Shun whose untimely death upset its previous plans, and have since boomed him, advertised him, sung his praises and literally rammed him down the throat of China, and through control of foreign news agencies, compelled the world to accept him at their own estimation. Immediately after the defeat of Chang Tso-lin and installation of the new puppet president, this *bloc* launched the drive for the negotiation of a large foreign loan to enable their favorite to consolidate his power and at the same time provide the funds which would ensure the prompt payment of overdue salaries without which the *bloc* could not exist. The fact that Chang's Manchurian armies were still intact preparing for another test of strength and that Sun Yat-sen retained his political prestige and power in the South, counted for nothing with the *impresarios* directing the activities of the Kin-Han warlord. They refused to see that any loan at this time to Wu Pei-fu would only be dissipated in financing further military operations under the pretext of forcing unification at the point of the bayonet, an invitation to prolong the civil wars which have brought China to her present deplorable plight. Lending money to Peking before unification of all political parties is like pouring water through a sieve. The more that is loaned the longer internal strife will continue. A loan to China prior to the establishment of a stable government representative of the whole country is putting a premium upon civil warfare, a crime not only against the Chinese people, but a betrayal of foreign investors influenced to believe that all is well in Cathay.

Li Yuan-hung had hardly taken his seat in the puppet presidential chair, when the consortium representatives in Peking were approached for an advance of \$2,500,000 per month to defray administrative expenses, to be secured on the increased customs revenues. Although the ministers of the consortium powers concurred in that some financial assistance to China should be considered, the Japanese minister took the firm and sensible stand that any advances pending complete unification would constitute an unfriendly act, a direct intervention in the internal affairs of the country. At this time, we are informed, the Chinese were willing to approve of international audit and control over their foreign loans, utilizing the estimated increased income from the new customs tariff now under revision as security for a bond issue to cover defaulted obligations and current administrative expenses.

The attitude of Japan was endorsed by the other powers and the Chinese overtures turned down pending the establishment of a government representative of all sections of the country. In the meantime, the distracted temporary cabinet, between being mobbed by unpaid employees and harassed by foreign creditors, has moved heaven and earth to raise the wherewithal to maintain itself in power. Finding all sources of foreign financial assistance closed, it turned once more to native bankers for relief. Here they also met with cold rebuffs because of the fact that the salt revenues set aside as the security for various loans advanced by the Chinese Banking group have been diverted to other purposes and, as a consequence, the native bankers who issued the railway car loan last year are unable to meet their obligations to the foreign manufacturers. Typical of the methods employed to raise even a paltry hand-out was the attempt to obtain a loan secured on the Shanghai mint, an establishment as yet in the course of construction, with the machinery ordered, and delivered but still, unpaid for. Against this scheme, the American minister lodged a protest. Failing to receive financial assistance from within the country and with the mid-autumn settling day only a few weeks distant, the cabinet ministers are scurrying to escape responsibility. Unless Wu, Sun, Tsao and Chang come together without delay and sink their political differences for the welfare of the nation, China faces the prospect of being declared a bankrupt.

The initial steps to this end may be said to have been taken at a recent meeting of the consortium representatives in Peking

when they telegraphed their head offices that China was without a government and completely bankrupt, unable to meet even her current administrative expenses. This verdict, we learn, was approved by the ministers of the four consortium powers.

As it is impossible to dissociate the consortium banking groups from the governments whose support enables them to exist, this decision constitutes an official recognition of China's bankruptcy, a prelude to further diplomatic action. Unless unification is brought about quickly it is difficult to see how the next crisis can be weathered.

The appointment of a debt commission to audit and supervise China's finances while the country is disunited is no solution to the problem. Such intervention would be stubbornly opposed by all the independent *tuchuns* and obstacles placed in the way of the collection of revenues. Under present conditions, the only revenues that could possibly be attached and forcibly collected by foreign creditors are the maritime customs. The collection of the salt, wine, tobacco and railway revenues against the will of the people or the opposition of any of the powerful *tuchuns* could only be assured by an army of occupation holding down the principal trade centres of China. Obviously, such drastic remedies could only be applied as the result of a close understanding on the part of all the powers and in which each would contribute its proportionate quota of troops. It is difficult to believe that any foreign government at this stage of world stress would countenance such measures unless complete anarchy in the country menaced the peace of Asia and the vital interests of neighboring powers.

The one hope of establishing a workable foreign debt commission lies in the chance that the Chinese themselves, recognizing their own impotence to pull themselves out of the hole, will invite such friendly co-operation. Here, however, we face the certainty that there is no official in Peking who dares assume this responsibility. At the present moment all the old skilful loan negotiators have ducked out of sight, leaving the crisis to be faced by the foreign educated group of young statesmen headed by Drs. Koo, Wang and Yen. It is extremely doubtful whether any one of these able men would be willing to jeopardize their future careers by accepting international control over China's finances, even under an ultimatum of the powers. Yet the time must conceivably arrive when these conditions will be imposed by the powers in order to save China from herself.

In discussing this eventuality with various persons in Peking, their opinion was unanimous that the only Chinese political leader possessing the requisite moral courage and integrity to accept such conditions for the salvation of his country, was Dr. Sun Yat-sen. Coming from men breathing a propaganda polluted atmosphere and schooled by the claque to express admiration for Wu Pei-fu, such statements indicate a new trend of thought, a breaking away from influences which for several years past have molded foreign public opinion in the northern capital. These same people were open in their statement that the time had arrived when Dr. Sun should be given an opportunity, believing that his example of honesty would go far towards reducing corruption in the conduct of administrative affairs. It was recognized that his ascendancy to power could only come through complete unification, which in itself, would render superfluous the maintenance of large armed forces by the various provinces, and do away with the incentive to further misappropriation of state funds. As president or premier of China, Dr. Sun Yat-sen might go the way of others before him, but he is entitled to an opportunity. Although unification under a military satrap might unloosen the purse strings of foreign bankers, the impression is gathered that such financial assistance would be greatly facilitated by the election of a non-military leader to the presidency.

China has survived many financial crises. At the last moment money has been forthcoming from the most unexpected sources. She may survive the next settling day and drag along until the Chinese New Year. The chances, however, are against it. Naturally, the Peking officials are circulating the over-worked argument that China's inability to meet her foreign obligations is only a

transient phase, and the inexhaustible resources of the country are ample guarantees of her stability. This optimism and faith, however, cannot offset the plain truth that these resources are as yet undeveloped and unavailable as security for outstanding obligations. There is also a natural disposition on the part of all creditor nations to live up to the spirit of the Washington treaties and give China every chance to pull herself together, but, if during this long drawn out period of rehabilitation, the leading foreign commercial firms in China are forced to the wall by reason of the inability of the Chinese government to pay its current obligations, China will receive a set back from which she will not recover for many years.

The loss of American confidence and credit incidental to a prolongation of the present situation and the hardships imposed upon American traders will deprive China of American participation in future reconstruction loans and throw the burden of financing her development upon powers who might not hesitate under given conditions to revive the sphere of influence doctrine as the only safe guarantee that their investments would be properly safeguarded.

If, therefore, China is to be saved from herself, it would seem that the time is most opportune for the American government to take the lead in proposing some remedy whereby her finances may be placed upon a solid foundation. In justice to American policies, and to our merchants and bankers who have responded to the official invitation to develop China; in fairness to the other powers who have followed our lead and subscribed to our doctrines, and in friendly consideration for the Chinese people, President Harding and Secretary Hughes should instruct Minister Schurman to find some practical manner to apply the policies laid down by the Washington conference. Further drifting is dangerous. Unless some way can be found to save the situation and bring order out of chaos, the work of the Washington conference will go for naught. American prestige in the Far East will never survive another breakdown of our policies.

Stability and prosperity can come to China only as the result of a cessation from domestic strife. It will not come through the ascendancy of any one "strong man" in the person of some super-*tuchun* with great armies to enforce his mandates, but through political unification, a coming together of all factions and the selection of some non-militarist to head the new government. No man, no matter how strong, how honest, patriotic and capable he may be, can succeed unless he represents a unified nation. That is basic. And real unification will never come to China so long as any one factional chief is financed directly or indirectly from the outside. That also is basic.

It is no longer a question of whether Wu, Chang, Sun, Tsao, Li or Chen is the best man. A stop must be put to the financing of any one faction, and the way to stop is to stop right now. If foreigners are to finance a Wu Pei-fu government over a period while he is strengthening his position to crush Chang Tso-lin, or Chang is to be assisted to re-open the issue with Wu, China will drift into a position where foreign intervention will become inevitable. It is better for the foreign powers headed by the United States, to intervene in China at the present time in a friendly and helpful manner by insisting upon unification at once rather than to drag out the agony by financing the Wu Pei-fu cabinet for another ten months and then perhaps be compelled to intervene in unfriendly manner. Prompt unification and the formation of a coalition cabinet, means prompt assistance from the financial instrument of the powers, the consortium. Any attempt to defy the powers at this time by seeking to raise outside loans, will not only defeat its purpose but create greater difficulties for China.

If we wait another ten months or a year for the parliament to draft a constitution and Wu Pei-fu to settle his score with Chang Tso-lin, the control of China will have passed out of the hands of the *tuchuns* into those of the bandit chiefs. As the mandarins gave way to the militarists, the latter will give way to the bandit leaders. Over 40,000 so-called bandits are ravaging the province of Shensi, while the provinces of Honan, Anhui and Shantung are overrun with these gentry, to say nothing of the chronic situation in Manchuria, where the Hunghutzes defy Chang Tso-lin to suppress them.

In fact, nearly every province is overrun with these bands preying upon the helpless people. Towns are burnt and sacked, women torn from their homes, and men pressed into the service of the bands. Foreigners are siezed and held for ransom, and even the son of the redoubtable Christian General Feng was kidnapped from under his father's protecting wing on a recent trip to Kueiteh. The situation in Manchuria goes from bad to worse. Within the past few months several attempts have been made to interfere with the South Manchuria Railway, and recently the rail fastenings were loosened and the express wrecked. There is a limit to such practices. The forces of Wu Pei-fu, Chang Tso-lin and other military chieftains are helpless before the bandit rule. Any serious attempt to eradicate these bands only result in their augmentation by the desertion of the uniformed troops sent to suppress them. This is ANARCHY. This is CHINA. The foreign powers can prolong the situation and make matters worse by financing any one faction, they can advance sums to Peking in order that parliament, the "salary demanders union" and hordes of officials can be sure of their pay for ten months more, but at the present rate of progress, when that time expires, the white wolves of China will rule the country. The foreigner will again be asked to furnish the funds to restore order. A vicious circle. Stop it now.

GEO. BRONSON REA.

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"China's Financial Independence"

ACCORDING to American dispatches, Dr. Paul S. Reinsch has accepted the post of financial adviser to the Chinese government. A Reuter's report dated Peking, September 9, gives the gist of his speech before an informal gathering of high officials at Dr. Koo's residence, the subject being "China's Financial Independence." Dr. Reinsch said:

"If Chinese financiers and bankers take the initiative in elaborating a practical policy they can undoubtedly count on international support. The present situation calls for self-help, at least in initiating a plan, as the other nations are too busy with their own affairs. A practicable proposal regarding Chinese finance would, however, receive support. Nevertheless, we must realize how near China is to a financial breakdown and what it would mean. The underlying economic condition of China is so favorable that the financial problems could be easily handled were there initiative and co-operation.

"Dr. Reinsch proposed "a Constitution interim loan" of G.\$2,000,000 monthly for 10 months to give the government a chance to exist without worry during the constitution-making period. Meanwhile, a financial commission would elaborate a system of revenue reform with the co-operation of national and foreign banking representatives. Should the proposed consortium make the above loan its representatives would co-operate with the financial commission. This was the time when such assistance should be given. Later, it would be unnecessary, or too late to avert financial disaster. Such co-operation between the Chinese government, Chinese bankers and foreign financial experts would in itself restore the credit of the government. Should the consortium decline to make such a loan or propose terms which would induce a long discussion by parliament and consequent delay in the completion of the constitution it would then become necessary to invite banks outside the consortium to take up the matter.

"The taxable resources of China, when they could once be reached by new legislation after the constitution has been established, were far more ample, he said, than the resources available in any other country except the United States. What China needed was not the much-discussed "strong man" but only a good financier and team work between the Chinese government and the bankers. "China does not come before the world as pleading for assistance but as offering a plan for the development of her financial resources."

The remarkable part of the plan outlined above is the threat to invite outside banks to finance China in the event the consortium declines to advance the necessary monthly payments to tide over the government until a constitution is drafted. It should not be overlooked that the author of the above plan is the author of the consortium, the energetic statesman who formulated the Far Eastern policy of the Wilson administration, and so directed American activities in this country, that the only escape from a return to the closed sphere doctrine lay in international co-operation as the only way that American capital could hope to participate in its future development. It was Dr. Paul S. Reinsch who laid down

the rules, got the American bankers interested, induced President Wilson to reverse his policy of 1913, apologize to Wall Street and carry through the program which definitely destroyed China's financial independence.

As representative of the American government, Minister Reinsch forced through the present consortium. Now that it is adhering strictly to the rules of the game as laid down by himself. High Financial Adviser Reinsch in his rôle of a Chinese official, threatens that unless the rules are broken, outside bankers will be invited to finance China. As a Chinese official Dr. Reinsch would destroy what he committed the American government and nation to build up.

It was always a mystery why the Lee-Higginson loan of 1916 fell through. Here was an instance where an American banking group had a contract to furnish the Chinese government the sum of \$25,000,000. In the final arrangements, the firm of Lee-Higginson and Company were to have been made the fiscal agents of the Chinese government, and the first installment of \$5,000,000 was to have been paid over; \$1,000,000 at once, and the balance within fourteen days. The \$1,000,000 were paid, but the balance was never forthcoming.

In the chapter on the "Downfall of Yuan Shih-kai" in Dr. Reinsch's book ("An American Diplomat in China") he says:

"At this juncture I had to decide whether to allow the Lee-Higginson loan to be completed without a caution and warning, or to assume responsibility of virtually stopping that transaction. As soon as it became clear that open opposition to Yuan Shih-kai's government was no longer confined to one province and its immediate sphere of influence, it seemed no longer proper for any American institution to furnish money to the Chinese government. Many appeals had been made by the opposition based on the demand that, since the country was divided, no loans should be made to the government. In ordinary circumstances the protests of factions would not have weight, but when several provinces expressed their disapproval of a basic governmental policy the case was different."

The Lee-Higginson loan stopped with the advance of \$1,000,000, and from the confessions of Dr. Reinsch, it would appear that his official intervention was the direct cause of its failure. We can see no difference between the situation existing in the spring of 1917 and the situation to-day. The Peking government is not representative of the country as a whole. It is the puppet of one military leader, opposed by the three eastern and several provinces in the south and southwest. A loan to Peking at this time that would enable the Wu Pei-fu cabinet to consolidate its power against the protest of other sections of China, would come under the same category as the one which Dr. Reinsch, as American minister, so effectively squashed in 1917.

The originator of the consortium fashioned an instrument which deprived China of her financial independence and then clamped and double riveted the yoke so it would stay put. It will be difficult to release China from financial dependence upon the consortium, and, if as Dr. Reinsch now advocates, outside banks are to be invited to finance the Peking government, and they succeed, why all agreements will be declared off and other independent banks will take advantage of the scramble that will be sure to follow. We will return at once to the same situation that preceded the organization of the consortium, with an open field for all.

It took over three years of the most strenuous diplomacy to perfect the present consortium and the irony of it all is that although its creators fashioned an instrument calculated to destroy Japan's financial influence in China, a turn of the wheel has given to her the right to oppose any loan to Peking before complete unification is brought about. British and American sentiment may favor a consortium loan at the present time to the Wu Pei-fu cabinet, but it is hardly probable that her partners will insist upon Japan joining them in a financial adventure which the consortium was specially designed to guard against. Japan holds the whip hand for the moment. And as there seems to be no likelihood of a break in the consortium understanding, its creator stands aghast at his own handiwork. Dr. Reinsch is placed in a most unenviable position. If his plan goes through it would mean the destruction of the consortium and a return to a free for all scramble in which the independent Japanese banks will not be far behind those who

may break the deadlock. Past experience warns us that American capital will be slow to invest in China, and the urgent needs of the Peking government will again cause it to turn to Japan for financial accommodation. As long, however, as the various governments act in good faith and support their respective groups, it is difficult to see how Dr. Reinsch can break the shackles he forged and riveted upon China's financial freedom.

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The Goat

ON board one of the big Pacific liners two years ago, a Japanese friend came to me and said "I didn't know that the Gaimusho (Japanese foreign office) had a goat." What do you mean by goat, I asked? Well, I have just left the smoking room where there is a spirited discussion going on about Japan and America, and someone said that Mr. So and So (a well-known diplomat) had got the Gaimusho's goat and everybody seemed to think it a huge joke. When I also laughed, he gravely insisted that it could not be true as he was certain the Gaimusho did not keep a goat. It took some time to explain the exact meaning of the word "goat" in the vernacular American, and the nice distinction of being made one and of the sport in getting the other fellow's animal. "I see," he said, "Japan has been made the goat so often in Chinese affairs that there must be quite a herd browsing around the Gaimusho's lawn." I met my friend a few weeks ago and in inviting my attention to the foreign office protest against an article in *The Times*, he remarked quite casually, "there goes another of the Gaimusho's goats."

I inclined, however, to view the matter from the other angle and see in it another attempt to make Japan the goat in China. It was not so very long ago that Mr. F. W. Stevens, the representative of the American group in the consortium, in a speech before a student's gathering in Peking, invited attention to the fact that the consortium plan was proposed by the American department of state in the summer of 1918, following or in the midst of the so-called Nishihara loans, a fact he mentioned as significant, a plan unquestionably dictated by friendliness to China." Now, the real truth behind the American invitation to the other powers to join in a new international financial combination arose from the fact that the activities of the Wilson administration had effectively closed the door to further independent American financial participation in the development of China and international co-operation became necessary in order to abolish the spheres of interest. The Nishihara loans had absolutely nothing to do with the motives underlying the formation of the new consortium, but this pretext was seized upon by its official sponsors in order to divert attention from their own blunders. Japan was made the goat in order to cover up the mistakes of the Wilson administration in China. It was either the consortium or an *exposé* of its own inefficiency, so the administration reversed its policy of 1913, and requested Wall Street to again enter the Chinese field, and behind the smoke screen of a violent anti-Japanese press campaign escaped an inquiry into its activities.

Japan became the goat of the Pacific. The pressure brought to bear upon her by the United States and Great Britain influenced her to throw overboard old policies and work in harmony with her new partners. As a result of a most bitter anti-Japanese campaign the so-called unsecured Nishihara loans were repudiated. Not a cent of interest has been paid to date, and this adventure into the Chinese financial field stands as a dead loss to the three banks which accepted the invitation of their government to advance the funds. Intervention in the internal affairs of China through the financing of the northern party, recognized by all the powers as the *de facto* government, taught Japan a costly lesson. Since then, the consortium leaders have time and again gone on record that complete unification is the first requisite to a Chinese government loan. The highest officials of the Japanese government have reiterated the

same statement for the benefit of all parties in China. In the words of Baron Ijuin of the Japanese foreign office, the advice of his government to China is to UNITE, UNITE AGAIN and keep on UNITING. Only then, after a stable government representative of the whole country has been established, could Japan demonstrate her friendship by remitting her share of the Boxer indemnity and joining with the other powers in furnishing reorganization loans to China. The policy of the consortium has been the policy of Japan.

In the meanwhile another civil war broke out in China, a conflict between Wu Pei-fu supported by British and American sentiment and Chang Tso-lin, overlord of Manchuria, the alleged tool of Japan. Wu won in the initial trial of strength and a campaign was at once started to railroad through a reorganization loan that would consolidate his power and repeat the deal of 1913 which enabled Yuan Shih-kai to solidify his despotic rule and crush the parliamentary movement headed by Sun Yat-sen. The consortium representatives at Peking were requested to advance monthly payments amounting to \$2,500,000 to be secured on the estimated increase of the customs duties. Although the foreign ministers agreed that the time might be propitious for assisting the Chinese government, no definite arrangement was arrived at, and while the matter was being considered the situation in Peking rapidly changed. It soon became evident that Wu Pei-fu would be unable to consolidate his position and force unification. The Japanese minister, remembering the costly experience of his own country in attempting to bolster up any one faction in China, very wisely took the stand that any loan to the Wu Pei-fu government before complete unification would be considered by the Chinese as an unfriendly act, an unwarranted intervention in the internal affairs of their country.

We now learn from a dispatch to *The Times*, dated Peking, August 4, that the diplomatic corps had agreed to extend financial aid to China but that this was blocked by the opposition of Japan. *The Times* correspondent then indulges in day dreams and confesses that he is not in a position to know whether Japan's opposition was prompted by a desire to exercise pressure over the Shantung negotiations or whether it was due to her disinclination to see the firm establishment of a stable Peking government until the restoration to his former influence of General Chang Tso-lin. Whatever may have been her true motive, adds *The Times* correspondent, it amounts almost to a crime to deny China such assistance as to save her from her present financial straits and to help her to restore order.

We have here another picture of the playful pastime of making Japan the goat, in which the confessed speculations of a correspondent is published by one of the greatest newspapers of the world as legitimate news. It was taken for granted by the *bloc* who had been grooming Wu Pei-fu for the job of dictator, that his temporary victory signified immediate unification of China, that it was all over but the shouting. It never seemed to occur that unification might also mean recognition of the Kuomintang and its leader, Sun Yat-sen, or that even Chang Tso-lin might have a kick left in him. As matters have turned out, Sun Yat-sen is very much alive and attending to politics, while Chang from all reliable reports is reorganizing his forces to have another crack at Wu. Under the circumstances, a loan to Wu Pei-fu that would enable Peking to unite the country at the point of the bayonet, simply meant that the foreign advances would have gone the way of the Nishihara contributions to the Anfu faction. It is safe to say that very little would have been expended on actual fighting, and the time would again arrive when the Chinese would approach the foreigner for further advances in order to restore order.

If, as *The Times* correspondent asserts, "the diplomatic corps in Peking agreed to extend financial aid to China," it was surely about time that some diplomat rose to the occasion and vetoed a proposition that would only have prolonged civil war and political unrest. The attempt on the part of *The Times* correspondent to make Japan the goat for her common sense attitude, influenced the Japanese foreign office to issue the following statement on August 14:—

"Dispatches published in *The London Times* and some other journals criticizing Japan's recent attitude towards the question of financial aid to the Chinese government have come to our notice. We wish to repeat the fact that the attitude of the Japanese government towards China is, as has on occasion been declared since the days of the last cabinet, one of non-interference in China's internal affairs, and we neither favor nor disfavor any particular party or faction in that country. To favor or support a particular influence in China would be tantamount to furthering her domestic strife. This would be most unfortunate to China, and would also work to Japan's disadvantage.

"We sincerely respect China's sovereignty, and wish for her peaceful advance and development. It is our hope that, at the earliest possible date, China will promote peace and well-being within her borders, open up her natural resources, and attain a healthy political development. If these hopes are realized and when the time is ripe for the establishment of a unified government representing the will of the people of China, the Japanese government will gladly give as much support as circumstances will permit to a government thus backed by the Chinese people as a whole. The government and people of Japan hope and believe that this happy occasion will be brought about before long by the efforts of the Chinese people themselves.

"But at the present moment, when that occasion has not yet arrived, Japan considers it most appropriate to refrain from giving financial aid to the Chinese government. The reason is: should aid be given to the central government of China while her political situation is unsettled and while that government is constantly swayed by the influence of some clique or other, it would not only be contrary to the principle of non-interference in China's internal affairs, a principle which has frequently been avowed by Japan and which has equally been observed by the other powers, but would also destroy the tendency towards better conditions which has just set in through the efforts of the Chinese people, and would thus interfere with the realization of a unified government, the result being greater chaos in China. In the opinion of the Japanese government, therefore, it is yet premature, in the light of the present political situation in China, to give financial aid to the Chinese government at this moment. This attitude of the Japanese government is in complete harmony with the purpose of the nine-power treaty and resolutions relating to China, which were adopted at the Washington conference; the opposite course of action would be an infringement upon the spirit of those international engagements. Such being the case, the Japanese government have no intention to alter their policy frequently declared in the past."

It cost Japan over \$200,000,000 to express the above sentiments. If we remember rightly, *The Times* correspondent at Peking was one of those who denounced the Nishihara loans and encouraged their repudiation. It was a crime on the part of Japan to bolster up the Anfu military faction, but now that the shoe is on the other foot, and the favorite of *The Times* correspondent is on top, it is crime not to support him. Japan may have been responsible for the advantage her loans conferred upon the northern military group, but nevertheless it was recognized by all nations as the *de facto* government. In the eyes of the Wu Pei-fu clique Japan may again be guilty of a crime in opposing financial assistance to their favorite, but we feel certain that the liberal element in China, the party of Sun-Yat-sen and the adherents of Chang Tso-lin, will be duly grateful for this evidence of her disinterested friendship. By this one act, Japan wipes out the past. A few more "crimes" of this nature will undo the propaganda of years and endear her to the Chinese masses. Japan has been made the goat long enough. It is time for fair play.

* * *

The Creaking of the Shantung Door

THE Japanese have no doors in their own houses. When they travel abroad and discover these facilities for ingress and egress in other people's homes, especially in China, where they are large and ponderous, they take a childish delight in swinging them back and forth, turning the knobs, fiddling with the keys, pushing the bolts in and out, inspecting the hinges and banging the old things just to see how they work. A door is a wonderful thing to a Japanese; it has so many uses. Now, if there is one thing that jars the nerves of the inhabitant of North America is the creaking, squeaking and slamming of doors. They hate to hear a door slammed. It is not done in polite society. A door can be closed gently and the key turned so as not to attract undue attention or violate the conventions. The booming of the great guns in Europe left Americans indifferent for three years, the crash of tumbling dynasties phased them not, the roar of the elevated railway and the rumbling of the subway and the strident cries of the street are as balm to the jaded senses of the New Yorker, but let some one whis-

per, "Hark! did you hear that?" "No, what is it?" "Why, it sounded like the creaking of a door over in China." Nothing annoys like the noisy noise of a closing door in China. No matter whether the Chinese are busy erecting obstructions to the free and unrestricted passage of Americans through their many angled gateways, or that other powers have quietly fenced off private preserves, yet when the Japanese makes a noise like the closing of a door, Americans at once sit up and take notice. It is not always necessary for Americans to hear the noise themselves. The confidential statement of any Chinese that the Japanese are fiddling with the hinges is sufficient to bring forth an immediate protest.

The Japanese are queer people about doors. For the past eight years they have guarded the portals to Shantung and have been very generous about conceding other nations a free passage to the trade beyond. Amongst other things they accumulated when Tsingtao surrendered in 1914, was the control over a railway, equipped throughout with German materials. Even the nails on this road bore the mark "made in Germany." One of the first things the Japanese did was to change all this. They decided that the door that had been closed to American manufacturers for so many years by the Germans, and without any loud protest on their part, should be opened to them. In fact, the Japanese said, we will make an American railway out of this little *Deutsche-eisenbahn*. And they did just that little thing. The locomotives and cars, the rails, machine tools and other accessories that have poured into Tsingtao the past seven years, all bore the trade-mark of some American firm. From behind the familiar American locomotive, trailed the passenger and freight cars, which if not all made in America, were built to American specifications.

Now the Japanese also build locomotives and cars. Of 3,122 locomotives in use on the Imperial Government Railways in March, 1920, over 31 per cent. were constructed by Japanese firms. The actual capacity of the various Japanese locomotive shops is about 350 locos per year. The number supplied to the Imperial Government Railways in 1920 was 170. The time had to arrive when, if these shops were to be kept going, foreign markets would have to be developed to absorb the surplus. The same with cars. As the Japanese government could not purchase its railway material requirements abroad during the war, the home manufacturers were encouraged to extend their plants in order to supply the domestic demand. In the meantime, American manufacturers were called upon to furnish the broad gauge rolling stock for the Korean, Manchuria and Shantung railways. They had a practical monopoly of this trade, and in the case of the Shantung line supplied forty-one locomotives. Now, if the Japanese had been anxious to build up a market in China for railway materials and rolling stock, it would have been an easy matter for the government to have ordered its locos and cars direct from Japanese manufacturers, at least, sufficient to have given them an entering wedge.

However, the foolish Japanese did nothing of the kind. They continued to place their orders for the Shantung Railway in the United States. Came the Washington conference and the agreement which compromised Japan to evacuate Shantung. About this time, the railway needed a few more locos and cars to take care of its growing traffic. The war boom was over and the limitation of armaments deprived the great Japanese machinery builders of their best paying work. They turned to their government for relief, and suggested that an opening be found for their products on the Japanese controlled railways in China. It is true they had never before built standard gauge rolling stock, but they could try. The Japanese government suggested to its civil administrator at Tsingtao that if an opening could be made for Japanese manufacturers in supplying the requirements of the Shantung railway, it would help the home industries over a very trying period of depression. Shortly after, an order for six locos was placed with two Japanese manufacturers, and the noise that ensued could be heard over the rumble of a crumbling China. A door had been slammed. American and British firms had been frozen out and

immediate protests were made against the violation of the Hay doctrine and the Washington treaties.

In confidence, the information had been imparted to the American legation that the Chinese and Japanese delegates on the Shantung commission had entered into a secret agreement to purchase all materials for the Shantung Railway exclusively from Japanese manufacturers. Of course, such confidential disclosures of a secret agreement could only come from some of the Chinese connected with the negotiations. The American minister immediately protested against the violation of the "open door." Not that the placing of the order for six locomotives was in itself of importance, but the principle of equal opportunity had to be defended.

The Japanese simply state that as far as any secret agreement is concerned such a thing is mere piffle. They say the Chinese have followed their usual custom of setting one set of officials to watch the other, and, as in the case of the Washington conference where certain people's delegates were present to watch the official appointees, they have followed the same procedure in the Shantung negotiations. Here, they assert, are a number of so-called "Shantung Observers" attached to the Chinese delegation, representing the people of Shantung province. In order to give these unofficial delegates an official standing, the Chinese government is paying them the nominal sum of eight dollars per month. When the Chinese delegation files into the committee room, with its group of "Shantung Observers" included in the delegation, its chairman can truthfully inform the Japanese that everybody there is a "Chinese official." Dr. C. T. Wang and the other appointees of the Peking government are being watched like hawks by the Shantung representatives and as the Japanese point out, "if anything secret can be put over with this group of sleuths on the job, they would like to know about it."

On the other hand, they state that the real secret attached to the placing of the order for locomotives with Japanese manufacturers is that the Chinese had no money to pay for this new equipment and asked the Japanese to purchase the locos and accept their paper promise to pay in the future, in other words, to add it to the Japanese bill. As the railway is not yet turned over to the Chinese government, and is still under control of the Tsingtao civil administration, a bureau of the Japanese ministry of war, the Japanese government had a perfect right to place the order where it saw proper, without the invitation of tenders. They furthermore state, that in addition to the six locomotives whose purchase was agreed to by the Chinese, an order for forty cars has been placed in the same manner. These cars will not be delivered until next year, when the line will have been turned over to the Chinese, but again, the latter said they had no cash to pay for this material, and as the railway required the cars, they requested the Japanese to supply them and accept their I.O.U. That is all there is to the story, say the Japanese. They furthermore invite attention to the fact that if they are to be paid for the Shantung Railway in five year bonds or longer, they are entitled to impose the same terms and conditions as obtain in all other Chinese railway loan agreements, viz, that preference shall be given to Japanese materials during the life of the loan.

If the confidential information furnished the American authorities at Peking is correct, then Minister Schurman did the proper thing in promptly protesting against the closing of the door to American manufacturers to equal opportunity in the supply of materials to the Shantung Railway. If, however, he was misinformed as the Japanese insist that he was, the incident simply revealed how nervous Americans may become when someone tells them a door is creaking somewhere in China.

The question is bound to arise sooner or later, whether China as a sovereign state, is not at liberty to place her orders for materials where she wills, with or without tenders that admit manufacturers of all nations to equal opportunity. As long as the Shantung railway remains under exclusive Japanese control, it would seem that her officials have the right to favor their own manufacturers without other powers protesting against a violation of the "open door." When the line is turned over to China, it would also seem

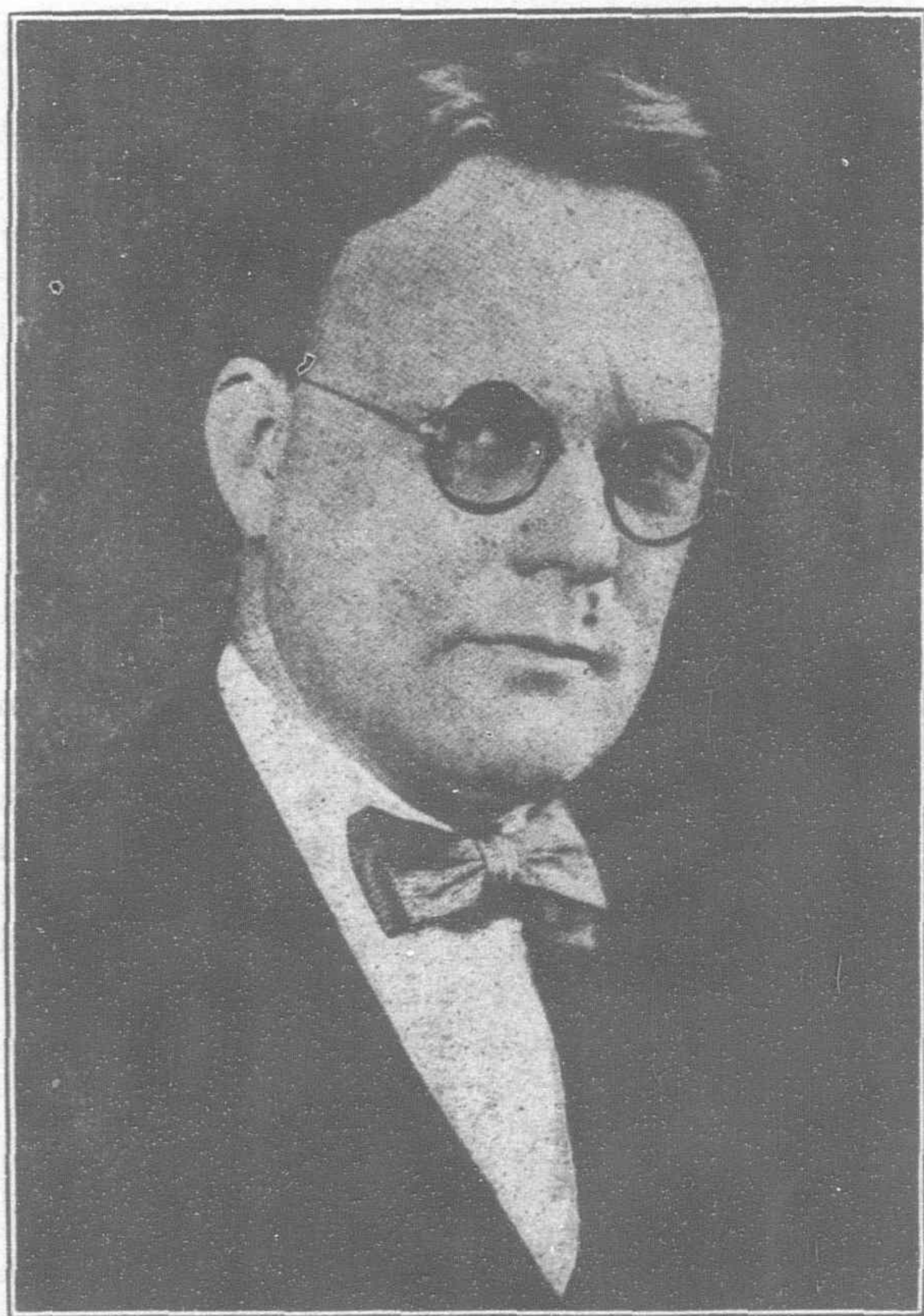
that the same fundamental rule would hold good. The original conception of the Hay doctrine was to save China from the spheres of special interest, in which American trade might be barred out by discriminatory laws and duties. The modern conception of the open door would seem to prohibit the Chinese government from exercising its undoubted right to purchase materials without submitting the tenders to international competition. In the case of the Shanghai mint, where this sovereign right was exercised and the machinery ordered from America without the British being permitted on opportunity to compete, there was no invocation on their part of the violation of the "open door" principle. In that instance, it was gross partiality, and unfair methods that were complained of.

Secret agreements are one thing and should be discouraged, but the right of China or Japan to exercise their undoubted prerogative in purchasing materials at their own discretion is another thing.

* * *

An Engineer Educator

THE time is rapidly approaching when Americans must revise their ideas about the education of Chinese and determine whether it is best to contribute large sums to continue their



Charles K. Edmunds, Ph.D.

President, Canton Christian College, since 1907
Professor of Physics, 1903 to 1907

Observer in Charge, Magnetic Survey of China
Carnegie Institution of Washington, 1905-1917

training in the United States where they absorb ideals difficult to live up to or put into practice on their return to China, or whether these young men are to be trained in their own country.

When Washington made his will he put into it a provision that there should be set aside a certain sum of money in order that Americans might be educated in the early constructive days of the republic under the influence of American institutions rather than have their young training under the royalistic influences of Europe. In like manner, China needs, in the young formative college years, institutions on the soil of China where men are trained to understand the problems of China, to think as Chinese and to talk as Chinese, to dress as Chinese, and to develop as Chinese. We cannot Americanize China. China should be assisted to develop as China, for in that way she will contribute most to the civilization of the world.

Along these lines the Canton Christian college, with a half-dozen like it, is working in a strong, modern, scientific way for a solution of one of the world's greatest outstanding problems, doing for China what must be done if Asia is to fulfil her part as a cog in the great wheel of modern co-operative progress.

At this head of this successful institution is Dr. Charles K. Edmunds, an American engineer and educator, who left home twenty years ago to bring to China the best of our civilization. At a recent testimonial dinner given in honor at Delmonico's in New York, Dr. Edmunds brought forcibly before his audience the necessity of educating the Chinese in China, for China.

"The reorganization of China by Chinese aided by foreigners actuated by friendly and not predatory motives, the introduction of foreign capital and the internationalization of foreign interests in a cooperative spirit with China constitute the only hope as regards China's foreign relations and even as regards her internal development.

"That China greatly needs energetic, resourceful and unselfish leaders is apparent from a mere glance at the gamut of problems which she faces, political, economic, social, physical, industrial and educational, many of which demand immediate solution or at least immediate attack. These leaders should receive the bulk of their training in China, for they need to know their own land as well as western science, institutions and methods.

"Then, too, the common people must be educated to form the background of general enlightenment and the foundation of progress. China's educational problem is enormous. A population of 400,000,000 requires for an adequate public school system not less than 2,000,000 teachers for all grades. It will require at least another generation to develop such an educational army.

"In attempting to establish a republic before the people, by education, are prepared for it, and to establish public schools before the government is sufficiently stable to finance them, China has undertaken the greatest educational problem of all time.

"Mere education in the science of the west, mere contact with western civilization, commerce, railways, telegraphs, mines, etc., cannot be expected to regenerate China, for the Chinese seem never to have been profoundly moved by other than moral and spiritual forces.

"Progressive currents are at work in China, and when you consider the size of the country and her lack of communications, her lack of money, and the character of the treaties imposed upon her by foreign powers, it becomes clear that while China is not entirely free from faults, her present condition is not entirely the result of her own actions or defects, but has been partly imposed by unfair actions of other powers. I am convinced that if all concerned would observe the policy of "Hands off China except to help," the Chinese would in due time solve their own problems. But we must allow China the same measure of time which we ourselves required to solve the problems of state rights *versus* federal control. The so-called chaotic condition of China and her backwardness are over-emphasized. From intimate knowledge of conditions I venture to assert that economically and commercially China is probably to-day more normal than any other large nation, and in spite of the political differences which exist she is to-day more homogeneous even politically than any equal aggregate population anywhere else in the world.

"The spirit or genius of the Chinese people very closely resembles that of the typical American, and it behooves us to realize that not only will a closer co-operation between our two nations be of benefit to China, but in a very real way it involves also the future prosperity of our own land and the peace of the world."

Here speaks the true American leader in China. China must solve her own problems from within, and to do this her sons must be educated in China where they will understand their own problems and be able to take an active part in their national affairs as soon as they have completed their education.

Days of the Compradore are Numbered

By O. D. Rasmussen

SIGNS are not wanting in post-slump readjustments in this country of a gradual revision of ideas in the value of compradores to foreign trading organizations in China. Not only have many firms begun to doubt if the compradore is worth the large commission he takes, but in several cases they have begun to operate without him.

For over a hundred years the compradore has been the connecting link between foreign firms and Chinese dealers. His middleman services were at first a political expedient, rendered obligatory by restrictions placed upon foreign traders at Canton, where the East India Company and others were confined to a limited area, outside which their nationals were not permitted to go.

As with other customs in China, once established the compradore system became a permanent idea in the minds of both foreign traders and Chinese dealers. The system passed from a political to a commercial necessity. Foreign firms were content, with large marginal profits, to be relieved of the burdens incident to marketing and buying in a difficult language, while the Chinese dealers were glad, for similar reasons, to trade with men who dealt with them according to their ways and in their own tongue.

Thus, unfortunately, foreign firms placed themselves in the hands of a group of non-producing middlemen, upon whose cupidity and whimsicalities has depended practically the entire foreign trade of China since contact was properly established over a century ago. It was unfortunate because foreign firms neglected the essentials of commerce by allowing themselves to remain in ignorance of the language and without personal contact with the people with whom they came to do business.

The compradore system, it must be conceded, was not without its facilities. It would not have lasted so long had it been otherwise. But great as those facilities have been, they constituted in themselves, an obstacle to the proper development of trade relationships. Many foreign firms have been financed by compradore capital and tided over difficult periods by the same financial source. Moreover, the compradore was a guarantee of the commercial integrity of Chinese dealers and, with his organization of market shroffs and other intelligence, able to keep more or less in reliable touch with markets inaccessible to foreigners, ignorant of the language.

Had the compradores always acted with conscientious regard for the welfare of foreign business and the commercial development of their country they might have fully justified themselves and consolidated their position. But they have not. They have fallen down in many big and little things that prove their inefficiency and lack of dependability, especially when confronted with crises such as that through which business has recently passed.

To begin with they never educated themselves to the degree necessary to keep abreast of changes in their own country. They were, in numerous cases, ignorant of their own language and customs, witness the many stupid Chinese translations of foreign names, given by compradores to, and accepted in good faith by, foreign firms. They have permitted foreign firms to market goods under trade-marks and illustrations that have been offensive to their own people and which have resulted in failures, in connection with certain goods, which should have, with different marks, found ready markets.

When the piece-goods and woollen goods exchange debacle smothered the entire economic structure in 1920, and Chinese dealers repudiated their obligations and in many cases fled from the jurisdiction of treaty ports, the reputed guarantees of compradores fell sadly to the ground. Their mythical guarantee was no stronger than the dealer himself. In fact, in many cases, the compradores took up a position on the side of the dealers against the foreign firms. They backed the dealers, in spite of the latter's own responsibility for not booking exchange contracts to meet their engagements.

In connection with the same trouble, the compradores introduced and permitted Chinese dealers, upon no security whatsoever, to make contracts with foreign firms for piece and woollen goods, to an amount far beyond their ability to finance. Almost any office boy in a long gown, attracted by the profits of a 9/- tael, could enter orders for piece-goods. Consequently, with the cupidity and business acumen of an office boy these whip-poor-will dealers, gambling on the chance of getting a 12/- tael, found themselves overnight, facing gigantic losses on a tael that slumped to 6/-.

It is true that some inexperienced foreign firms, mostly American, dealt independently of compradores, but the large majority were dependent upon their middlemen for the integrity and financial security of dealers.

However, it is sufficient to prove the failure of the compradore system, when it is considered that with or without compradores, foreign firms were forced to the wall in the crisis.

If there are apologists who find extenuating circumstances in an extraordinary state of affairs such as the 1920 exchange slump represents, they would be hard pressed to find further apology for the combinations in restraint of trade practised by compradores during the period immediately preceding and following that crisis.

In North China, as an example, sheep's wool that in previous years was bought from dealers for 15 taels a picul, was gradually forced up by compradores to 45 taels. In constant touch with the home war demand as reflected by the purchases made by foreign firms in the wool market, the compradores pushed the price up by common consent. Costs of production in the interior never ascended one cent. The wool grower at inland points got very little more for his product than before, although the fiction that it was he who forced the abnormal prices was widely circulated.

By reason of "inside information," readily on tap through the medium of the foreign firms' Chinese office staff, who handled invoices, shipping documents and incidental data, the compradore kept intimate track of just how much profit the firms were making, and used it as a guide for his own quotations. To illustrate how subtle the compradore ring worked, this wool for a while remained at 35 taels a picul, when one foreign firm, anxious to get a big shipment away, offered 37 taels in order to corner as much of the product as possible. The next day firms asking their compradores for quotations received them at 37.

In many other commodities the same practice in restraint of trade was evidenced. Straw-braid, hides, egg products and other of those which found great demand during the war were forced sky high by the compradore ring. A personal interview with several of the leading men, when foreign markets stopped buying, evoked the statement that they would, under no circumstances, bring their prices back to normal. They said they would refuse to sell for two years or more, if necessary, to hold up the prices. They did hold out for a long time, but not two years. The 45 tael wool is now back at 15 and less.

There are firms in China, which broke away from the compradore ring many years ago and have not regretted it. There are firms which have only recently cut out middleman trading and they also do not regret their step. Aided by the facilities initiated by chambers of commerce, whereby instruction in Chinese language is given to employees by competent teachers, traders are gradually beginning to organize staffs capable of placing them in direct personal contact with Chinese markets.

Here and there in the foreign trade group firms are reported to be working independently of compradores. The breaks are becoming more frequent and firms have an increasingly large representation at inland points where the raw products of China are marketed.

China's foreign trade stands to benefit greatly by the change, for not only will foreigners obtain a more satisfactory and closer business connection, but also they will be able to export and import cargo without the unnecessary taxation of ten or more per cent. profits of the compradore, who has long ago outlived his usefulness, such as it was, and whose halcyon days in the business of China were considered long ago to be numbered.

The Kochiu Tin Mines

KOCHIU, a city of about 130,000 inhabitants located in the southwest corner of the province of Yunnan, is the centre of China's tin mining industry. It is reached by the Yunnan Railway from Indo-China, the traveler alighting at Mengtze and proceeding by chair or pony across the mountains to the tin fields, located for the greater part near the tops of the mountain ranges enclosing the valley of Kochiu. The largest of these mines, ten miles east of Kochiu, is the Ma La Ko, then comes the Huang Mao San and about 100 others of varying extent and outputs. Not long ago the well-known firm of Shewan, Tomes & Company installed a pumping plant to furnish one of the larger mines with water. Their engineer, Mr.

William Semple, on his return to England, read a most interesting paper on the "Kochiu Tin District" before the institute of marine engineers, from which the following up-to-date data is abstracted. Mr. Semple says:

"It is difficult to get any information as to when the tin mining really started, as no authentic records seem to have been kept, and the only data I could find were on a tablet in one of the temples, which gives the date as about 400 years ago. All the mines are situated on the tops of high mountains or in the gulches between them. From my own observation I find that alluvial mining was carried on extensively in the earlier years, the ore being plentiful and easy to get at. It is said by some of the old miners here that when mining was first started it was to obtain silver, and during prospecting the great tin ore beds were discovered, and the abundance of tin ore in this district is really remarkable. Although alluvial mining was carried on extensively the miners opened tunnels in order to search for a finer grade ore, and some of these extend into the mountains from 2,000 to 4,000-ft. from 3,000 to 10,000 men being employed. The largest mining firm here is the Yunnan Tin Trading Co., who are at present introducing a large pumping plant, the installation of which was the reason of my visit, to enable them to work the whole year round and supply sufficient water for ground sluicing on their open

mines at Malaga Hill. The ore is earth ore, and when it comes out of the mines it is usually crushed by native methods, either by hardwood clubs or a stone crusher driven by water-buffaloes, then it is all hand-washed, the ore receiving about forty washings before it is smelted. The native furnaces are very interesting; they are built with mud bricks and have a little over a ton capacity. The air-blower, supplying air to the furnace, is native made; the barrel consists of a large piece of timber hollowed out and fitted with a piston, the air suction valves being of buffalo hide and the air discharge going direct into the bottom of the furnace. The whole apparatus is worked by manual labor, and it takes from eight to ten hours to make a cast; the smelted tin is run into sand

moulds; the metal obtained runs from 92 to 99 per cent.

"The Yunnan Tin Trading Co. have a large up-to-date smelting and concentrating plant, which was built by the Germans about ten years ago, and run by their own men. On the outbreak of war the Chinese took it over, and have never used it until quite recently, when they put it under an American administration, and when working fully it will handle 1,000 tons of ore a day.

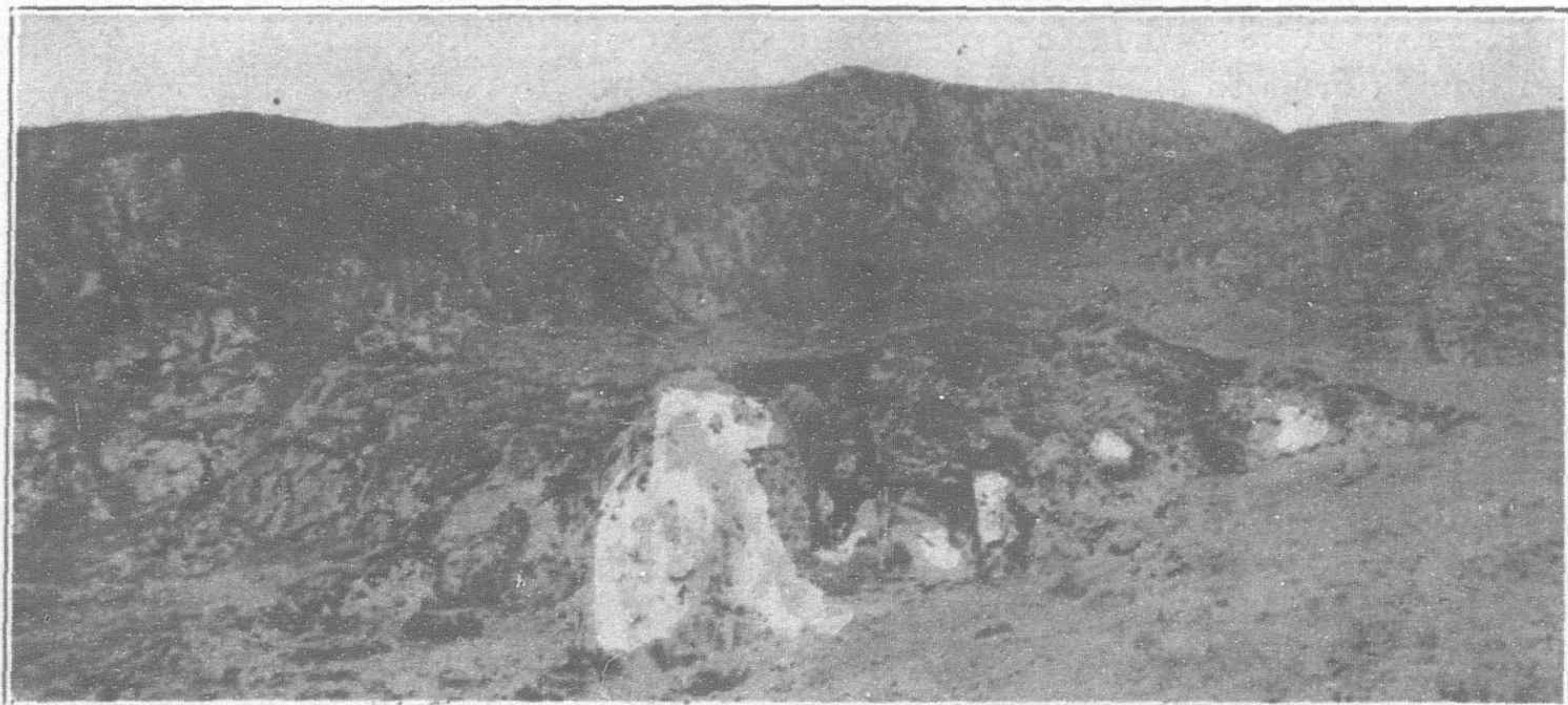
"The lay-out of the plant is very similar to other mining plants

—that is, when the ore is brought down from the mines it is taken by elevator to the top floor, where it enters the large ball mill, and is there crushed to a 16-mesh, afterwards going to a secondary crusher, where it is graded down to 100-mesh; from there it flows down shutles to jig concentrators, where it receives its first washing; from there it flows down to the Wilfley shaking tables below, where it is further washed and graded, the tailings passing out to ponds for re-treatment later on. As regards the percentage of tin obtained from the ore, there was some doubt raised as to being able to make

standard tin from the ore obtained at Malaga; the result was that the company brought out an expert metallurgist from America, who spent over three months sampling and assaying the ore, and he got some of the most marvelous results I ever saw. He showed me a sample he had taken from a large cast of tin bars he had made, and after

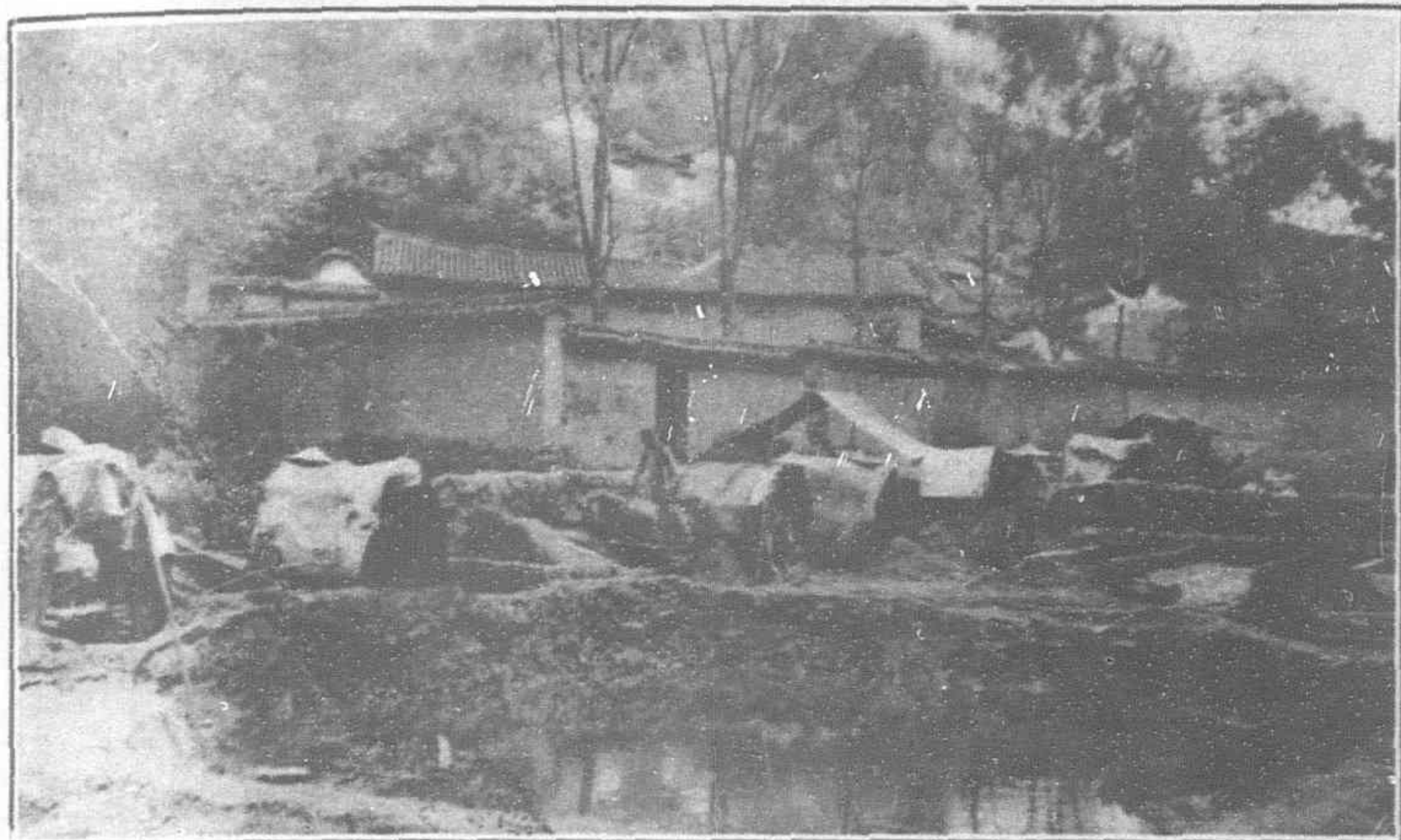


General View of Kochiu City, Yunnan province, the centre of the largest tin mining industry in China



One of the Tin Mines located about 10 miles from Kochiu

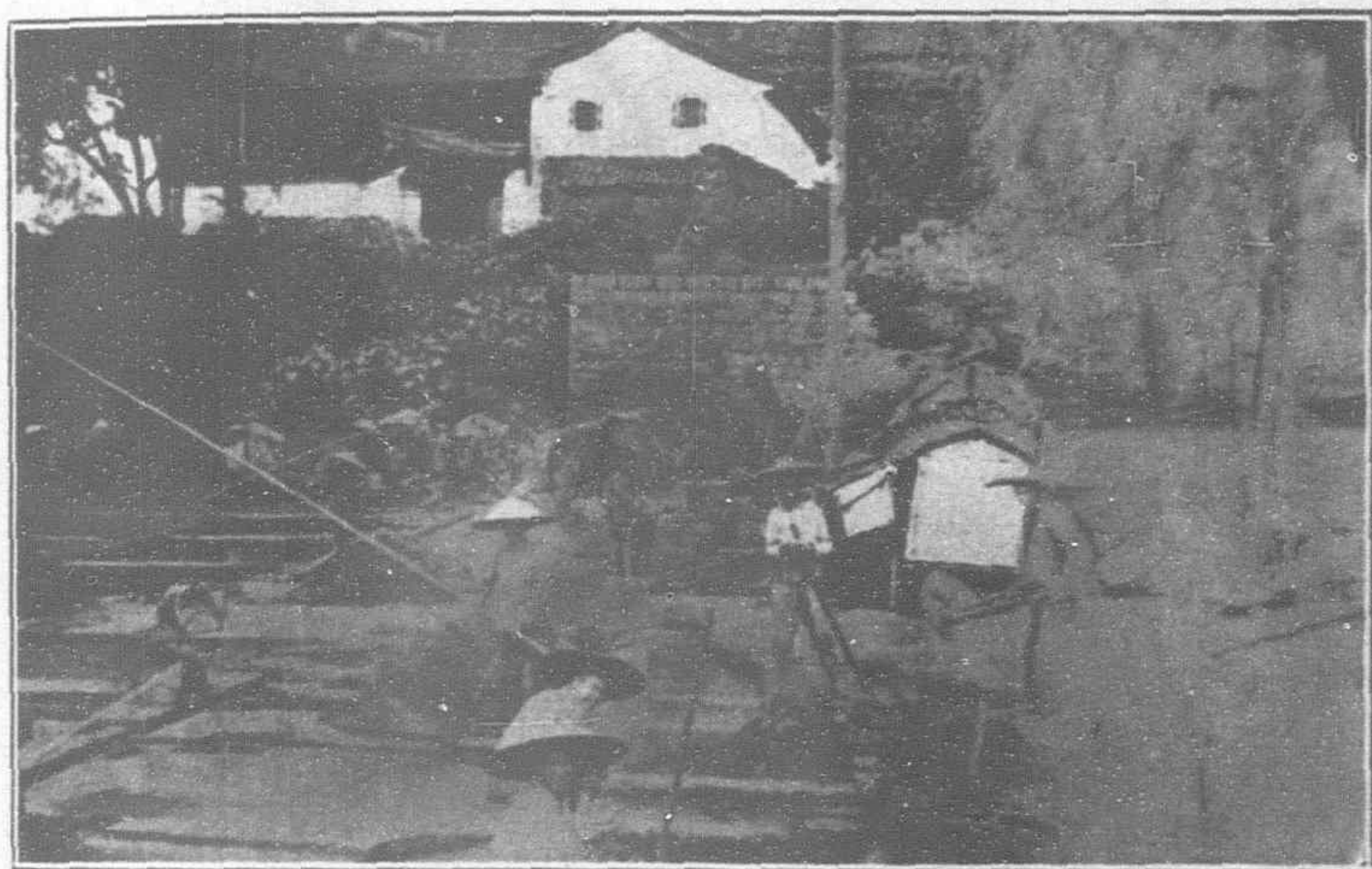
VIEWS IN THE KOCHIU TIN DISTRICT



Tin Ore Waiting for the first Washing



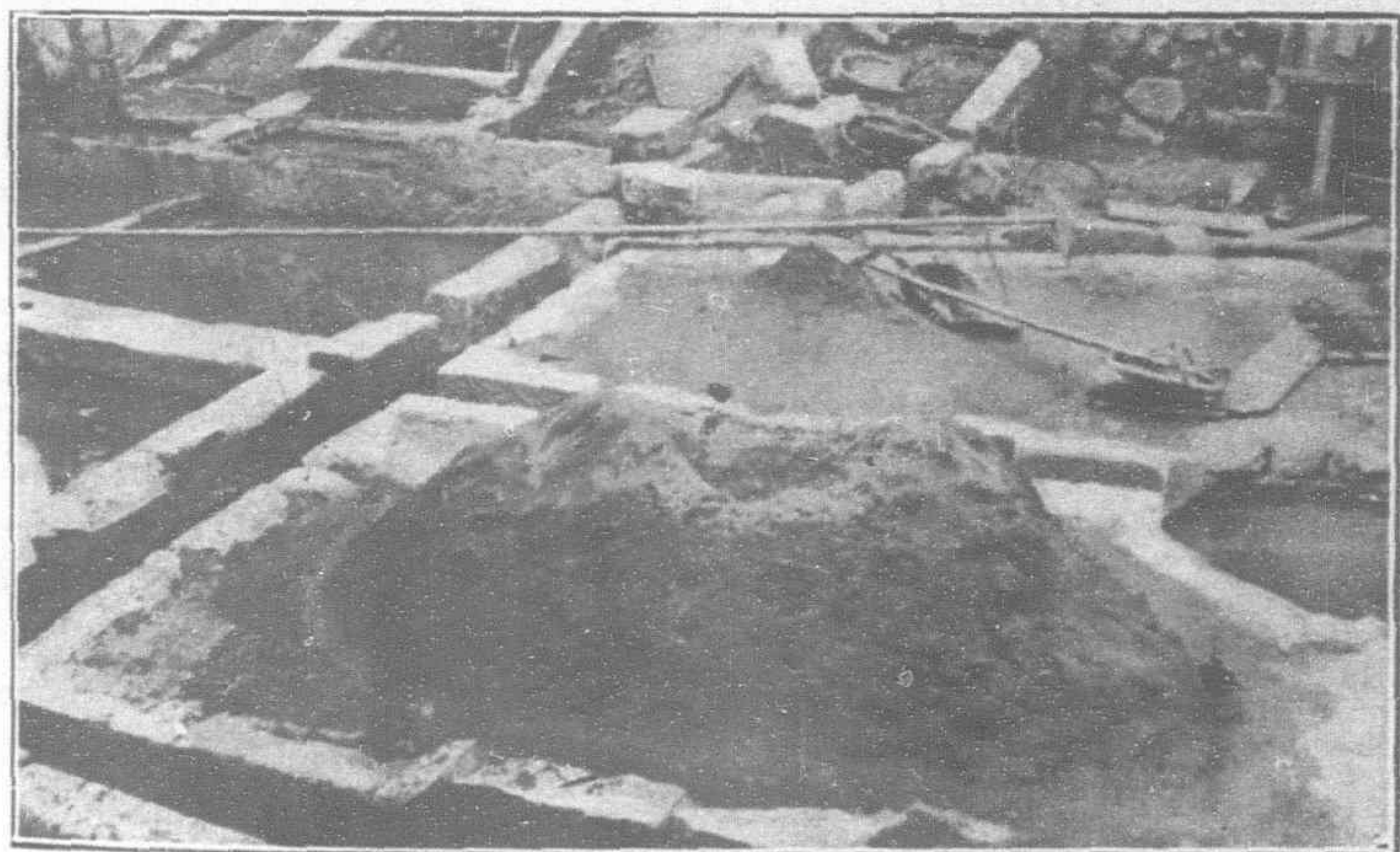
Tin Ore Washing Troughs



Washing Tin Ore in the Compound of the Kochiu Tin Trading Co.



Washing Tin Ore



Washed Ore ready for the Smelter



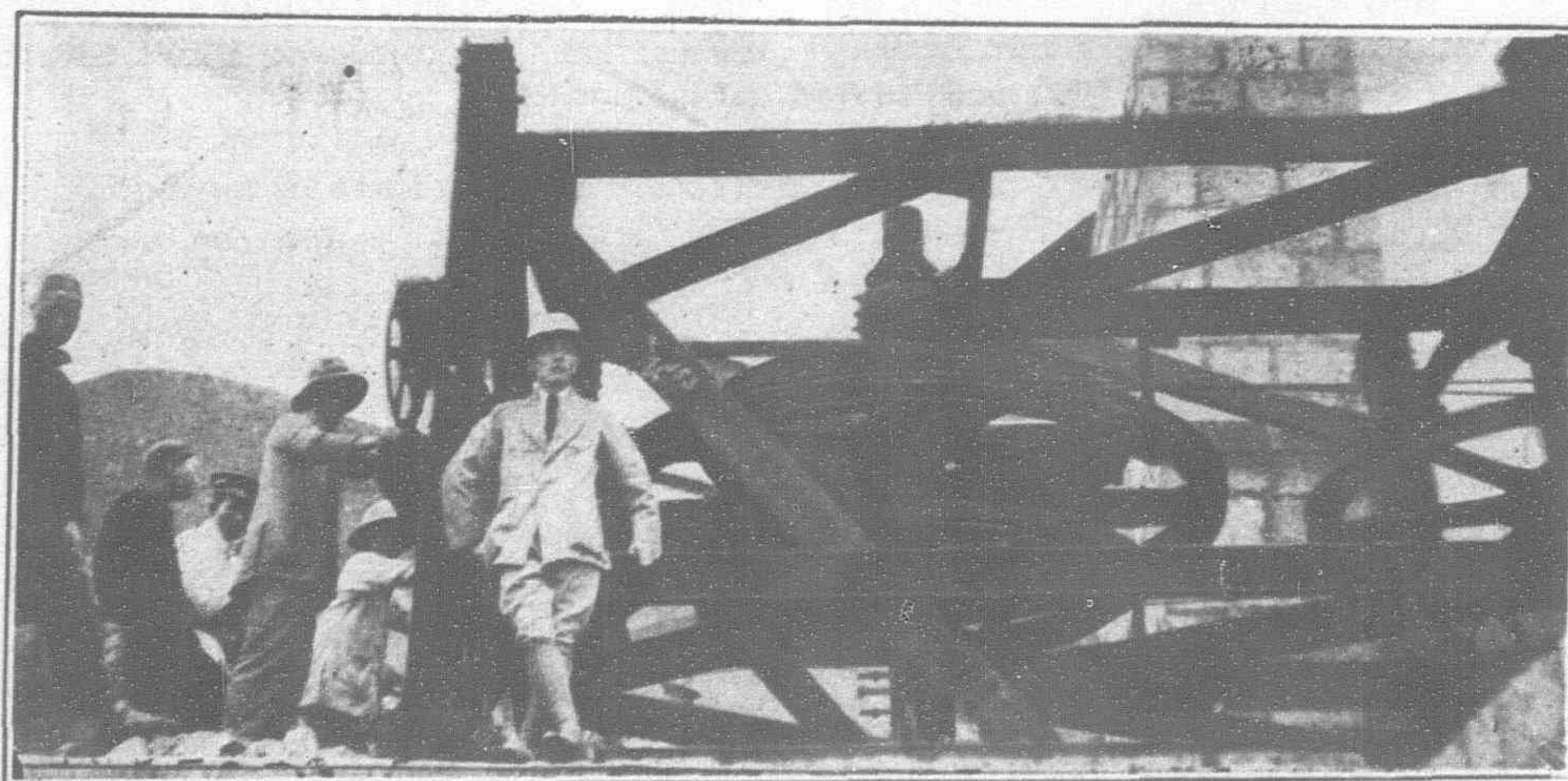
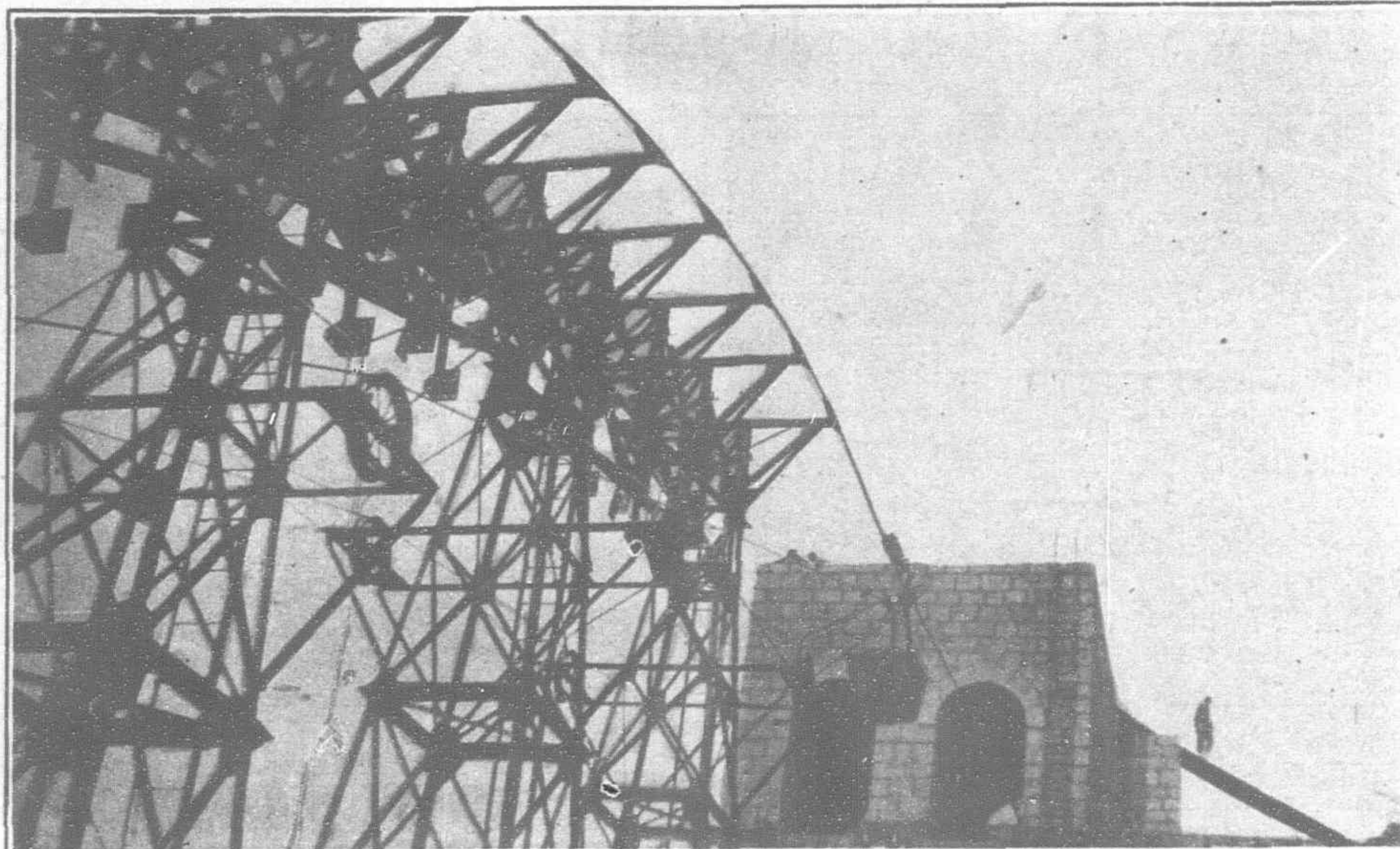
assaying them showed the high purity of 99 per cent., and he proved that standard tin could be made from these ores. He made out a complete set of plans for a new lay-out of their smelting and refining plant, which I understand they are going to put in next year. The smelting furnaces at present are on the Siemens-Martin principle, six in number, of ten tons capacity each, one gas generator supplying two furnaces. At present they only run two furnaces, averaging about two casts a day. The native furnaces are of the beehive pattern, and built of mud bricks and average two tons capacity, wood charcoal being used as fuel and the air blast hand-driven. These furnaces work very well, being easy to build and keep in repair.

"The conditions at the mines for boys and men are practically the same, and ventilation most inadequate, being absolutely devoid

of fans. Whether there are any mining laws relative to this province I don't know; there must be, as there is a director of mines in Yunnanfu, but I have never seen them, the native methods of mining being used for centuries. However, the administration has all been changed this last year for the better, as many Chinese are educated in American mining colleges, and are quite used to the existing conditions. I understand they contemplate sinking a shaft 1,000-ft. deep to connect into the present mine tunnels at different levels, and also putting in a proper ventilating shaft with fans; also rebuilding all the housing quarters with well-equipped hospitals and medical attendance, which is much lacking at present. When these alterations are carried out it will be ideal for the miners, as they will then be able to work regular hours, and all the ore will be hoisted to the surface in mine cars and dumped into bins. At present, what

causes the high mortality among the miners is coming out of these hot channels dripping with sweat, carrying their loads of ore, and being very thinly clad the cold air simply catches them, and they develop lung trouble, which, if not checked in time, turns into tuberculosis, and once they get that they only last about a week. They have no set hours of work at present; just simply so many loads of ore to bring up, the average being five; over and above that they get a bonus of 10 cents a load. These loads for the men average 133-lbs., and for boys about half that, or according to their strength. So you can imagine what that means coming out of a tunnel 4-ft. square and 2,000-ft. long, the floor having an incline of 45 degs. and the ore dump about half a mile from the mouth of the tunnel. As far as I understand their wages average from 50 cents to \$2 a day, according to their time of service. All the miners are well fed, but that does not compensate for the hard conditions they live under at present.

"The greatest trouble they have is in the refining of the tin, due to the percentage of lead and arsenic being high. Formerly it used to be shipped to Hongkong, and re-melted and refined before being put on the market, thus adding unduly to the cost. To overcome the difficulty they have engaged an American mining engineer, as well as a smelting specialist, to give attention to all the work near the mines and bring the tin up to the required standards to compete in the open markets of the world. Whether they will introduce modern methods of mining remains to be seen. I doubt very much if it would pay owing to the large overhead expenses in bringing machinery up the mountain, transportation being a very difficult and dangerous problem judging from my own experience in bringing the pumping machinery across. The cost of transportation alone was \$40,000. This gives an idea of the very wide margin of costs firms have to work upon when doing business in this pro-



Three Views of the Cable Transmission Line conveying Tin Ore from the Mines to the Smelter

vince. But when once the Chinese wake up to that fact with the possibilities of development, and put down good roads and make the interior safe for foreigners to live in (although they will certainly need foreign help to develop their resources and make conditions good generally all round), then the future of this province will become very bright."

The smelter above referred to, operated by the Yunnan Tin Trading Company was

founded shortly before the outbreak of the Chinese revolution in 1911. It is an official provincial enterprise under the direction of the finance bureau of the Yunnan government and like all Chinese official concerns has had its share of financial troubles during the past ten years. At one time it attempted to relieve the financial pressure on the provincial government by issuing its own bank notes, but in face of severe opposition was compelled to withdraw the issue. As the official company also works the rich Ma La Ke Mines it has managed to clear a fair profit and devote considerable funds to the betterment of its properties. One of these improvements, cutting down the excessive costs of transportation was the installation of an aerial conveyor to carry the ores from the mines to the smelter, and the pumping plant referred to by Mr. Semple, which is located at the foot of Lao Tu-shan. The plant consists of two triple-expansion Worthington pumps designed especially for this work by Mr. E. G. Norman, their engineer for China, and sold through Shewan, Tomes & Company. These pumps have a capacity of 7,000 tons of water per 24 hours delivered against a head of 3,000 feet. The water is taken from a reservoir of 3,000 cubic metres capacity fed by a small canal 23 miles long which carries the water from the Cha-tien river.

In addition to the larger smelter there are a number of the native variety, which produce an aggregate of 10 to 15,000,000 kilos annually, of which, the official smelter turns out

about 998,400 kilos. The highest output of the big smelter was 1,664,000 kilos. There are about thirty of the native smelters in the Kochiu region, which operate for only about four months in a year.

The construction of the smelters is very simple; the bricks being obtainable on the spot, they are not very costly to build. The blast is supplied by a wooden air-pump with piston packed with feathers, the usual instrument for providing blast in old Chinese forges and furnaces. Each furnace is run by ten men (five per shift) and a foreman.

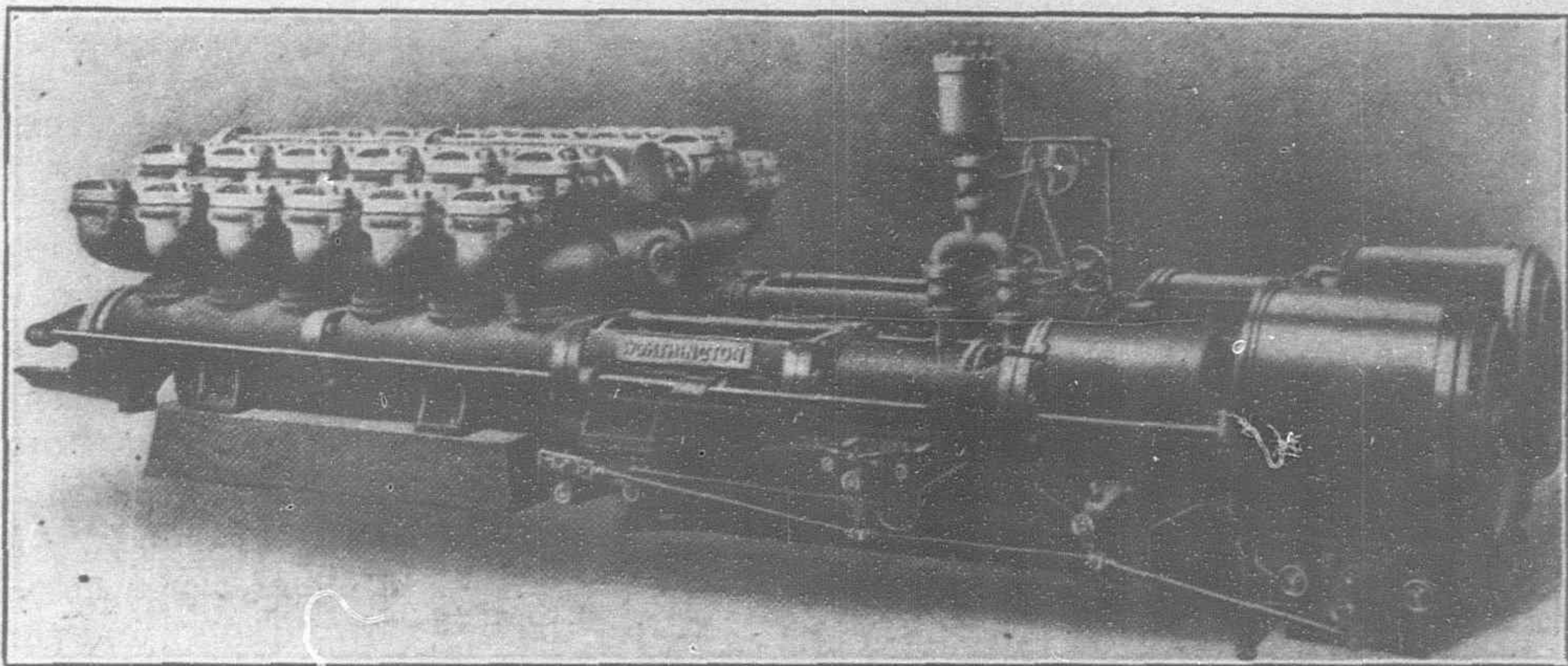
Six-hour shifts are customary. Three men work at the blower, one man sees that the metal runs well from the tap-hole. One man is engaged in feeding the ore and charcoal. In addition to these, there are two men engaged in pouring the metal. The slags from the furnaces are crushed and washed to extract the matallics. The remainder is re-smelted with ore until considered free from tin. It is then dumped as conveniently as possible anywhere in the town.

There is no attempt at refining the metal at Kochiu. The chief impurities are iron, often present to the extent of 1 per cent. and lead, usually less than a quarter of 1 per cent.,

though the metal from some of the mines may contain over 50 per cent. of lead.

Each slab, before leaving Kochiu, has to receive official "chops" or marks showing the slab has been weighed, and that the requisite taxes have been paid on it. When the slabs reach commerce, they usually also have been marked with the name of the furnace in which they were smelted, the merchant to whom they belong, and the transit agent through whose hands they have passed.

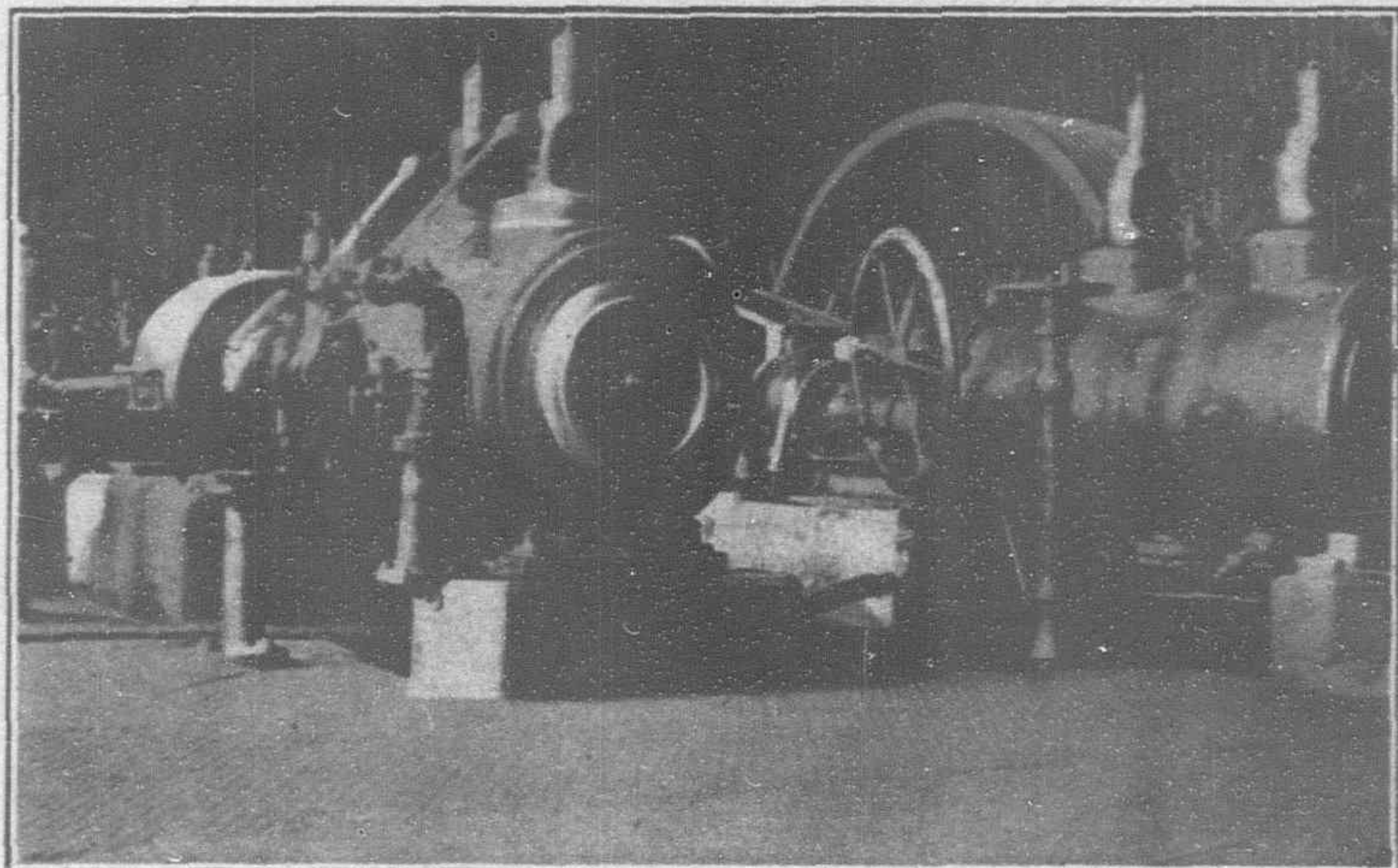
The miners pay no direct taxes to the government. A small local tax is sometimes laid upon concentrates for the upkeep of the roads.



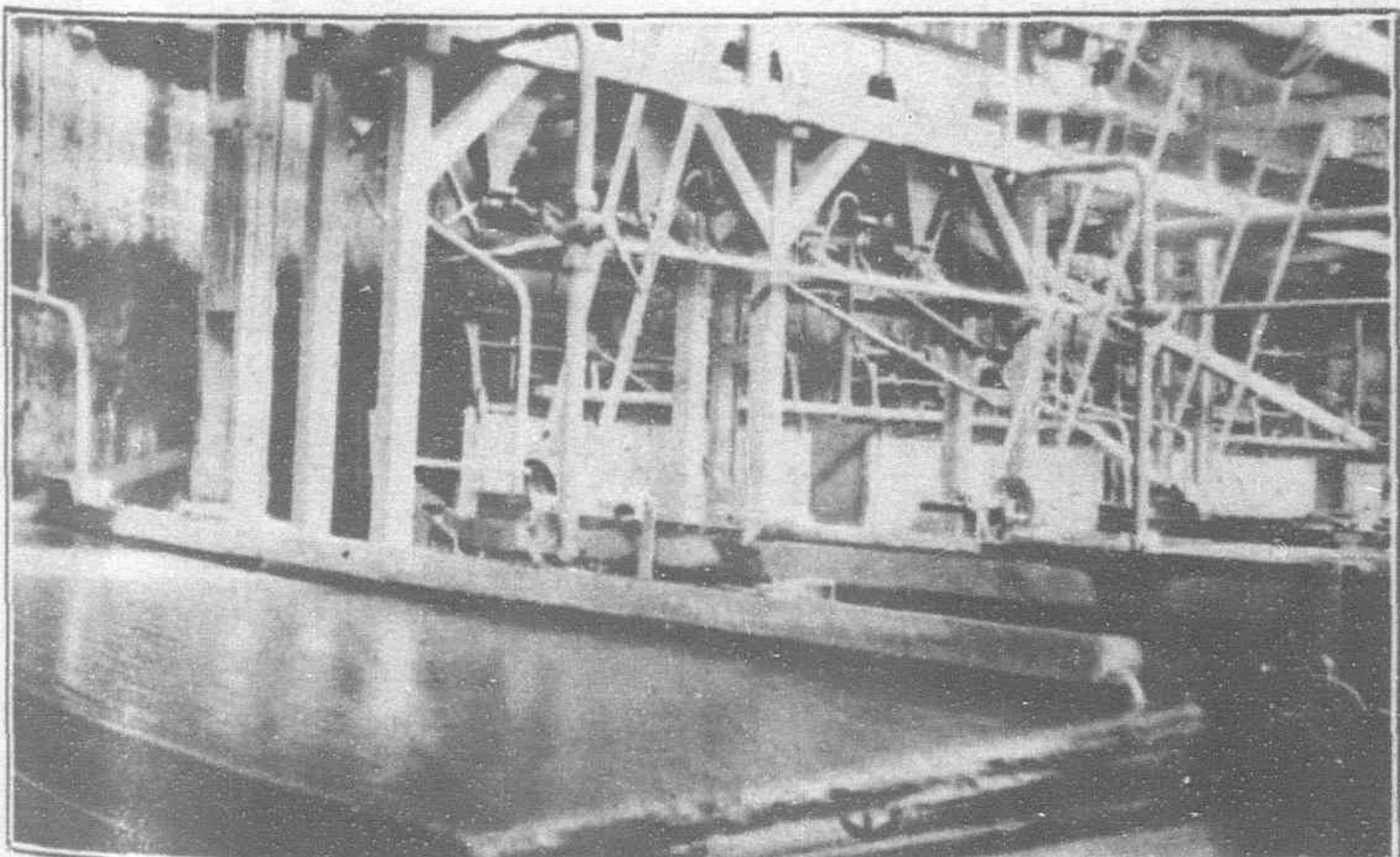
Type of Worthington Triple Expansion Mine Pressure Pumping Engine, installed at the Reservoir, delivering 7,000 tons of water per 24 hours against a head of 3,000 feet



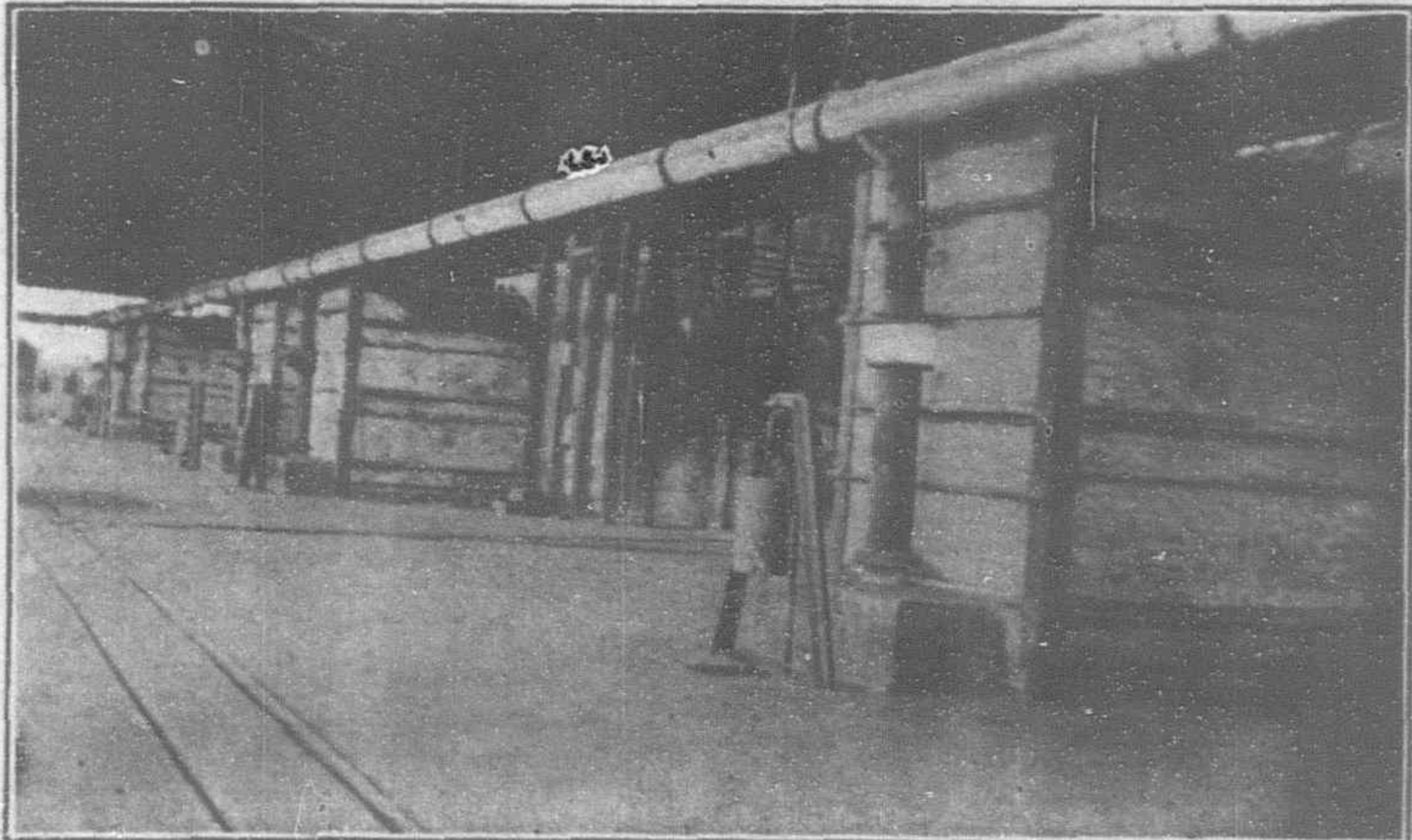
Site of Pumping Station to Supply the Ma Lake Mines, located over the top of the Mountain, 3,000 feet above the Reservoir



German Power Plant at the Kochiu Smelter



Ore Washing Plant



Siemens-Martin Tin Smelters

Iron and Steel in India

WITH the permission of the director of the geological survey of India, Mr. Cyril Fox, B. SC., M.I.M.E., F.G.S., an officer of that department, has contributed to the *Mining Journal* of London an article on "The Trend of the Mineral Industry of India."

An advance copy of the article is published in *The Indian Trade Journal*, from which we extract the following notes on iron and steel production:—

The iron and steel industry of India is in its infancy. In view of the developments that are taking place, and from a knowledge of the vast deposits of high-grade hematite in the belt of country from Mayurbhanj state westward to the states of Keonjhir and Bonai and the Kolhan sub-division of Singhbhum, this industry must eventually become of very great importance to India. Although much has been written of the Bihar and Orissa iron ores, it is, perhaps, not fully realized how immense are the quantities of available high-grade ore. Both the quality and quantity of hematite in this part of India are calculated to exceed the great American deposits of the Lake Superior region in Minnesota, Wisconsin and Michigan.

Although there are, at present, only two large iron works which are producing iron and steel in India, a third is rapidly being erected and others are projected.

TATA IRON AND STEEL.—Of the existing companies (1) the Tata Iron and Steel Works are established at Jamshedpur, in Singhbhum (B. & O.), a few miles north of Tatanagar, on the main B. N. Ry. line to Bombay. Originally, this company relied on the iron ores of Gurumashisni (Mayurbhanj state), but the neighboring deposits of Okampad and Badanpahar are being opened up. They obtain their limestone from Gangpur state, where there are two occurrences, near Panposh and Bisra. Although the quality of this flux is very good, the material is not cheaply obtained. The rock is not quarried, but mined, and, as may be imagined, the limestone question has not yet been satisfactorily solved. Their coke is made from Jherria coal. The production of these works has been (1919-20 exports from Jamshedpur) 50,000 tons pig iron, 75,000 tons of steel rails, and 60,000 tons of bars and girders, valued in all at 5 crores of rupees. Two more blast furnaces capable of producing 1,000 tons of pig iron a day, a new duplex steel plant capable of an outturn of 1,000 tons of ingots a day, and mills for plate, sheet, bars and rail and structural work, have been erected, and are practically ready for blowing-in and working.

To utilize the finished iron and steel products of their mills a number of subsidiary companies are being established at Jamshedpur: The Calcutta Monifieth Works, for the manufacture of machinery for the jute industry; the Enamelled Ironware, Ltd., for the manufacture of domestic utensils and other types of goods; the Tinsplate Company of India; the Agricultural Implements Co., the Indian Steel Wire

Products, Ltd.; the Enfield Cables Co.; and the Hume Pipe and Construction Co.

(2) **THE BENGAL IRON CO., LTD.** have their headquarters at Kulti on the Bengal side of the Barakar river. They obtain their iron ores from north-west Kolhan (a subdivision of Singhbhum) and Keonjhir state. The coke is made from Jherria coal and from the company's collieries at Ramnagar, near the works. Most of their limestone comes from Sutna (Rewa state, in central India), and partly from Bisra. They produce daily about 450 tons of pig iron, but utilize most of this in making castings of special types, chiefly railway sleepers and chairs. It is not clear when this company propose to re-establish their output of ferro-manganese.

(3) **THE INDIAN IRON AND STEEL CO.** are erecting works at Hirapur, on the railway between Asansol and Adra in Bengal. They will be supplied with iron ore from Gua in Kolhan, along the new railway extension, which leaves the main B. N. Ry. line at Amda and passes through Chaibassa to Jamda. The flux (limestone) is obtained from Gangpur state, and the coke is to be made from the coal of the local fields. At first the company will restrict itself to the production of pig iron, the present plant being designed for a daily output of 600 tons.

In addition to these there are a number of new companies.

(4) **THE UNITED STEEL CORPORATION OF ASIA, LTD.**, was registered in India in December, 1921 with a capital of £10,000,000, at 6½ per cent., by Messrs. Bird & Co., of Calcutta, and Messrs.

(Continued on page 579)

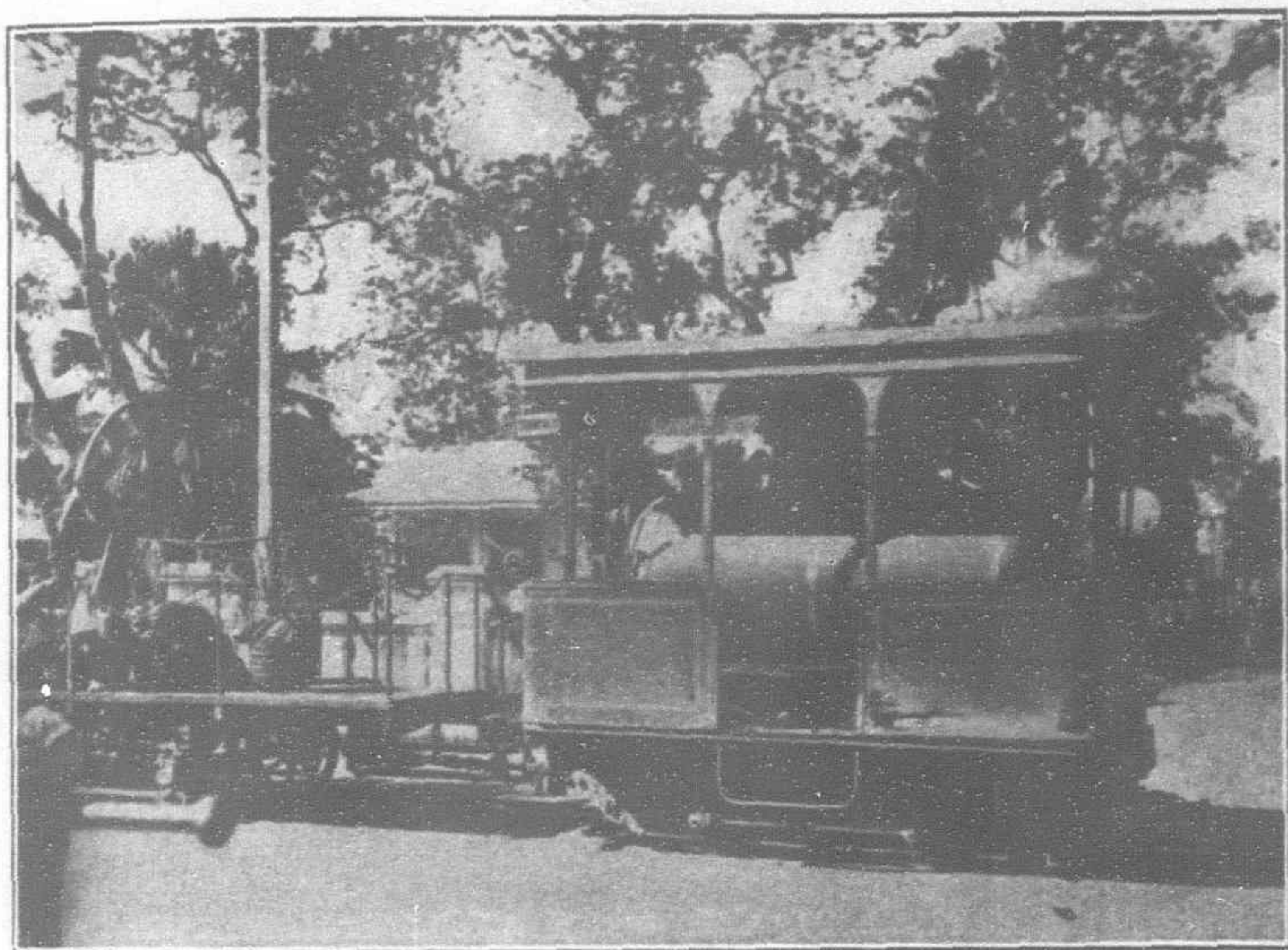


(Mining Magazine)

N. E. I. Railway Electrification

ALTHOUGH the plan for the electrification of the Java State Railways main line from Batavia to Sourabaya has been temporarily abandoned on account of financial depression, the project for the electrification of 50 miles of inter-urban lines in the vicinity of Batavia is rapidly nearing completion. An appropriation of 5,000,000 guilders is in the hands of the electrification department of the state railways, who, in connection with the department of waterpower and electricity, have outlined a three years' program.

According to Dr. G. de Gelder, head of the electrification department, the first of the new electric lines will be in operation next year. Although only a stretch of ten miles, connecting Tandjong



"Hohenzollern" Fireless Locomotive which now furnishes the motive power for the greater part of Batavia's inter-urban service. The locomotive is charged with super-heated steam at the power-house in Kramat, and under ordinary conditions will make the round-trip without difficulty. In case of a cold thunder-shower, or a traffic jam, causing the journey to occupy more than an hour and a half, the steam gives out and the stalled engine has to be rescued by the next one along.

Priok, the harbor of Batavia, with Meester Cornelis, one of the principal residential districts of the vicinity, the use of electric power will mean not only a great saving in fuel expenses, but an enormous saving of time for the commuters of the capital city. The European population of Batavia lives either in Meester Cornelis or Weltevreden, and are forced to make the daily trip to their business houses in Batavia or Tandjong Priok by railway or steam tram. The present time for a trip from Priok to Cornelis one hour and a half. The electric cars will make the trip, including stops, in 24 minutes. Ten minute service will be given at first, with five-minute service to be offered if the traffic warrants it. The whole length will be double-tracked.

The two other sections of the electrification plan, to be completed in 1924 and 1925, include lines from Tandjong Priok to Batavia, and from Batavia to Weltevreden, Manggarai, and Meester Cornelis. The entire system will be double-tracked, standard gauge.

The source of power will be hydraulic. The department of waterpower and electricity, which has surveyed the entire island for hydro-electric stations to be built as the electrification scheme materializes, has completed a plant at Tji Badak near Soekaboemi, for the inter-urban lines. The power be carried the 70 miles to Batavia at 70,000 volts, three-phase high-tension current. Two sub-stations at Meester Cornelis and Antjol, will transform it into 1,500 volts D.C.

Bids for cars, which will be of the overhead pantograph type, have been received from Dutch, German, Swedish, Swiss, British, and American firms. Although the awarding of contracts has been practically decided, confirmation must be received from Amsterdam before the awards are published.

"I can say unofficially," said Dr. de Gelder, "that a large share of the work will fall to American bidders. German bids were low, as was unexpected, but we were greatly surprised at the low figures quoted by American establishments."

The first order will include 20 motor units of two cars each, a number of electric locomotives not yet decided, and equipment for the sub-stations.

As soon as funds are available, work will be begun on the electrification of the mountain lines of Batavia and Preanger provinces. The need for electric service from Batavia to Buitenzorg and Bandoeng has been declared "urgent" by Dr. de Gelder, not only through the necessity for faster service, but because of the large amounts of fuel burned by the steam locomotives of the mountain lines.

The larger electrification projects have been laid aside until more prosperous times, although northern Celebes is being surveyed for possible electric lines in Minahassa.

Iron and Steel in India

(Continued from page 578)

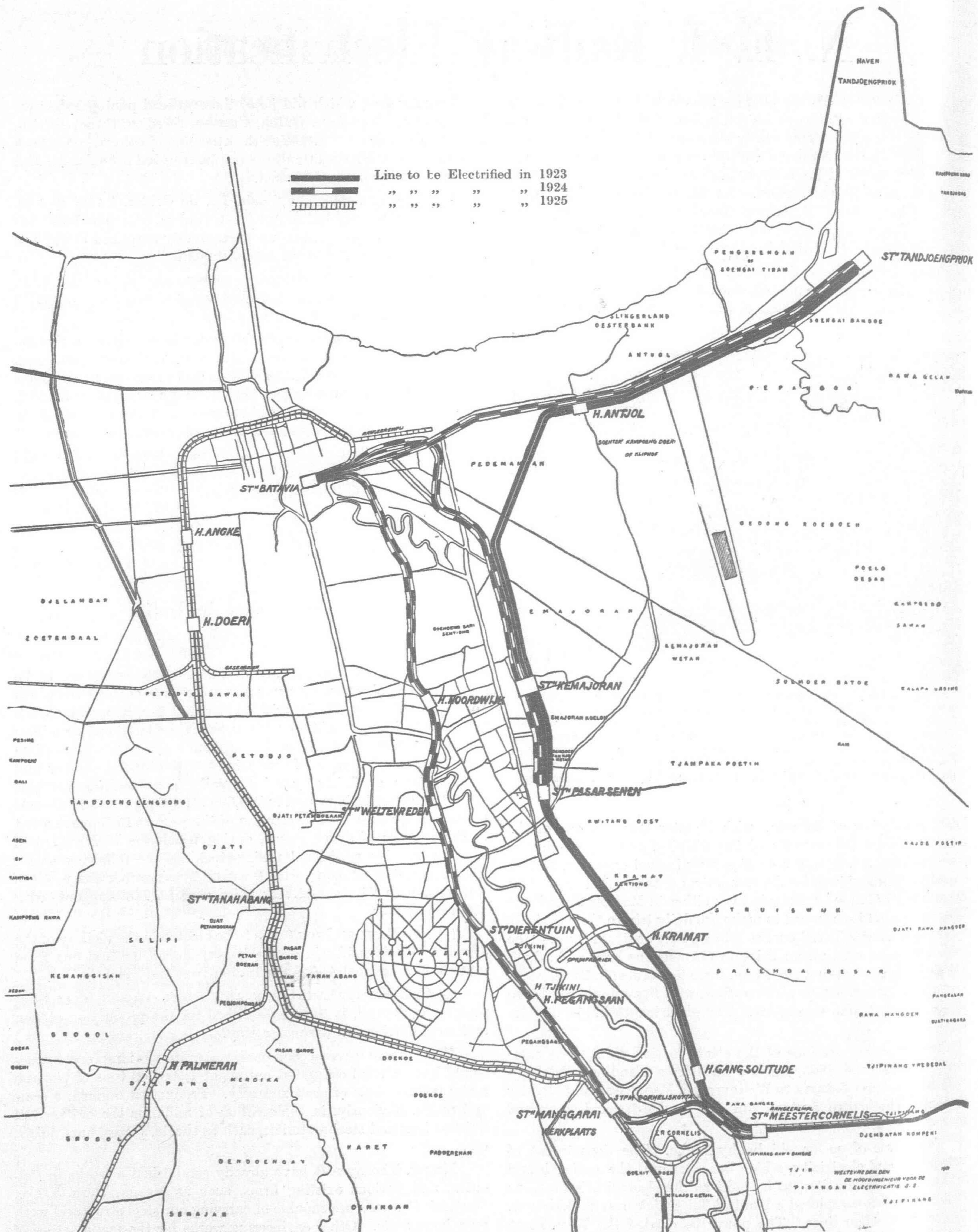
Cammel Laird, of Sheffield and London. The works are to be erected at Manoharpur. A new railway line is to connect the works northward, through Hesla, with Hutar and the Karanpura coal-fields. The iron ore will come from the Keonjhir-Bonai area, and the limestone, probably, from the Gangpur region. The immediate erection of plant capable of producing 300,000 tons of pig iron and 200,000 tons of finished steel annually is contemplated. This output will later be increased to 700,000 tons of pig iron and 450,000 tons of finished steel. The erection of the works will be carried out in three stages of development, during which the B. N. Ry. will have to provide additional rolling-stock on the following scale: First stage, 492 waggons, with 9 locomotives; second stage, 4,113 waggons, with 74 locomotives; third stage, 7,723 waggons, with 139 locomotives.

(5) THE EASTERN IRON CO. is to be erected in the vicinity of the Jherria coalfield, and will obtain its supplies of ore and flux from much the same localities as the Indian Iron and Steel Co.

(6) THE KIRTYANAND IRON AND STEEL WORKS, near Sitarapur, in Bengal, is to be established for the production of iron and steel castings in a smaller way.

When these several companies are in working order they would have a total estimated output of 1,500,000 tons of pig iron and 1,000,000 tons of steel annually. Production on such a scale will result, obviously, in the erection of mills for the out-turn of finished iron and steel materials, such as sheets, plates, bars, joists, etc.

Messrs. Thornycroft have already established a works in Calcutta, and various existing firms, such as Messrs. Burn & Co., Martin & Co., etc., are capable of carrying out steel structural work on a large scale. Other engineering works for the manufacture of machinery, such as the various railway waggon and locomotive shops, are enlarging the scale of their operations, and new enterprises are certain to follow with the revival of trade.



The FAR EASTERN MOTORS

MOTORING - AERONAUTICS - MOTOR BOATING

Motor Manufacturing in Japan

Interview with William I. Irvine, U.S. Trade Commissioner

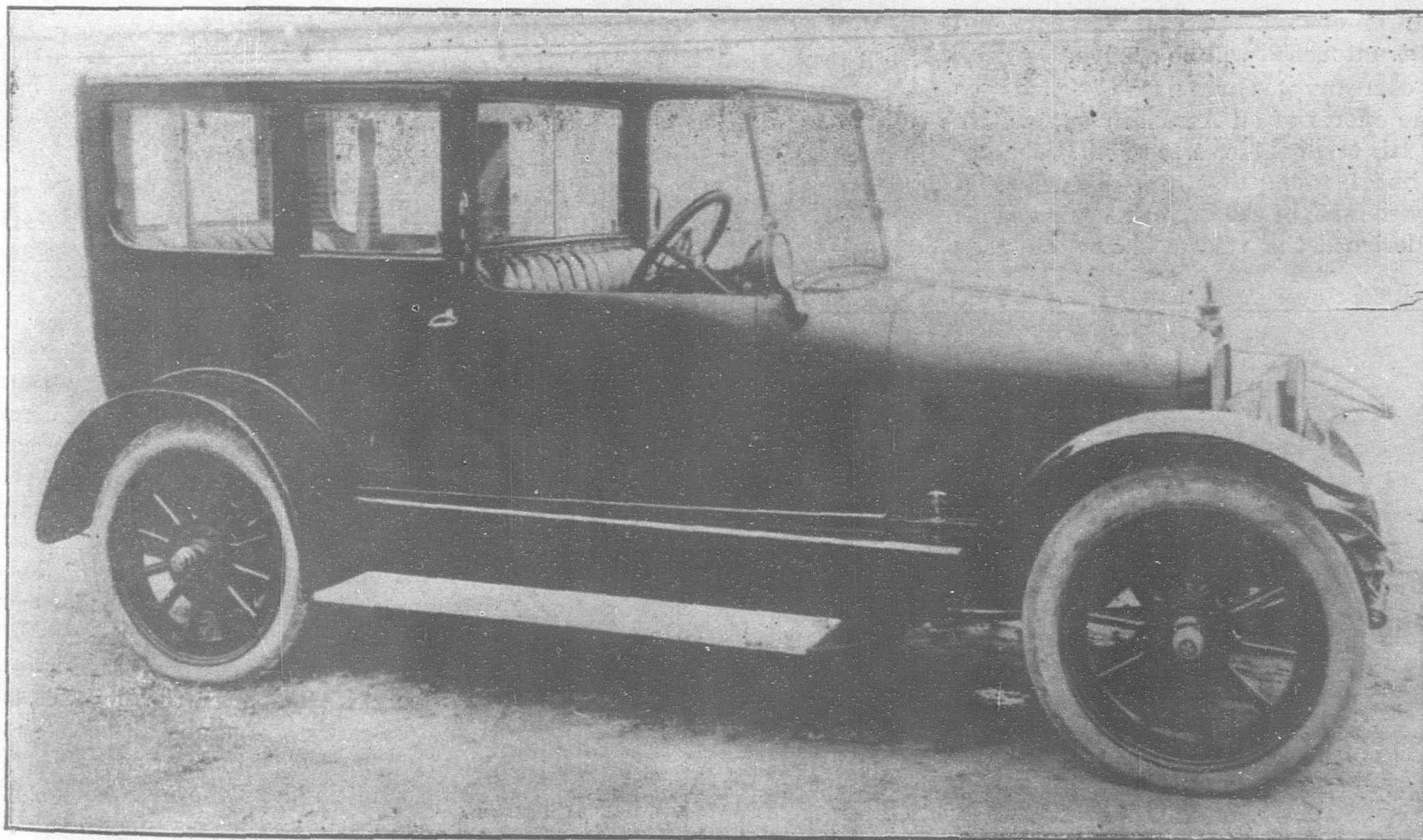


R. WILLIAM I. IRVINE United States trade commissioner, now touring Asia investigating and reporting on the automobile markets of this part of the world for the benefit of American manufacturers, has concluded a very comprehensive survey of the Japanese field.

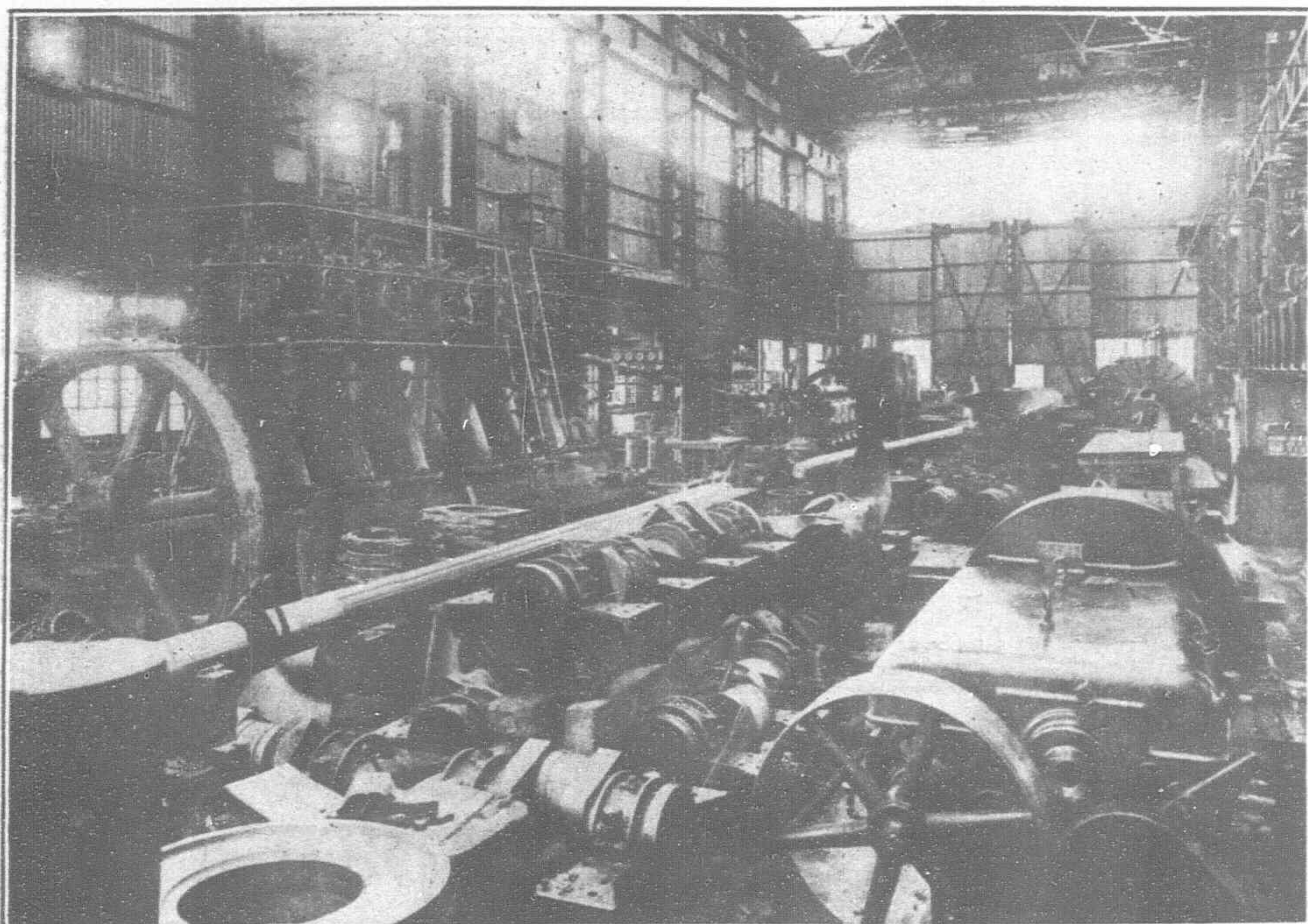
After some time spent in Korea, Manchuria and Central China, he is now on his way towards the Malay States and Java. In an interview given to THE FAR EASTERN REVIEW Mr. Irvine gave his opinion of the possibilities of motor manufacturing in Japan. Asked whether in his opinion it is possible for Japanese manufacturers of autos and trucks to compete with American and European makers, Mr. Irvine said that at present "two methods of motor vehicle manufacturing are being tested now in Japan: assembling with imported units, and the manufacture of the complete vehicle within the country. The success of both are now in the balance, and the results obtained will probably decide the question for those

manufacturers in other lines who are giving serious thought to this industry. Both tests are being made with cars the answer to the truck question having been given, it being that, on the whole, trucks cannot profitably be built to meet the competition of American vehicles.

"Assembling is now being done by the Ishikawajima Shipbuilding and Engineering Co. Ltd., of Tokyo, of the British Wolseley. The parts are imported from England and are assembled under the supervision of Britons by Japanese workmen, some of whom have been trained in England. Present production is said to be ten of the 10 horse-power type per month, but this could not be confirmed. The specifications are: 4 cylinders 2 $\frac{9}{16}$ -in. by 5 $\frac{1}{4}$ -in. with 1,700 RPM developing a speed of 40 miles per hour. Tread 3-ft. 10-in., overall length of chassis 10-ft. 7-in., overall width of chassis 4-ft. 8-in. allowing a body space of 5-ft. 5-in. by 2-ft. 3-in. with a 99-inch wheelbase on detachable 28-in. wheels. The total



Mitsubishi Body on a Templar Chassis.



Kobe Works of the Mitsubishi Company. Motor Department; Erecting a 400 H.P. Diesel Engine for Electric Generating Set.

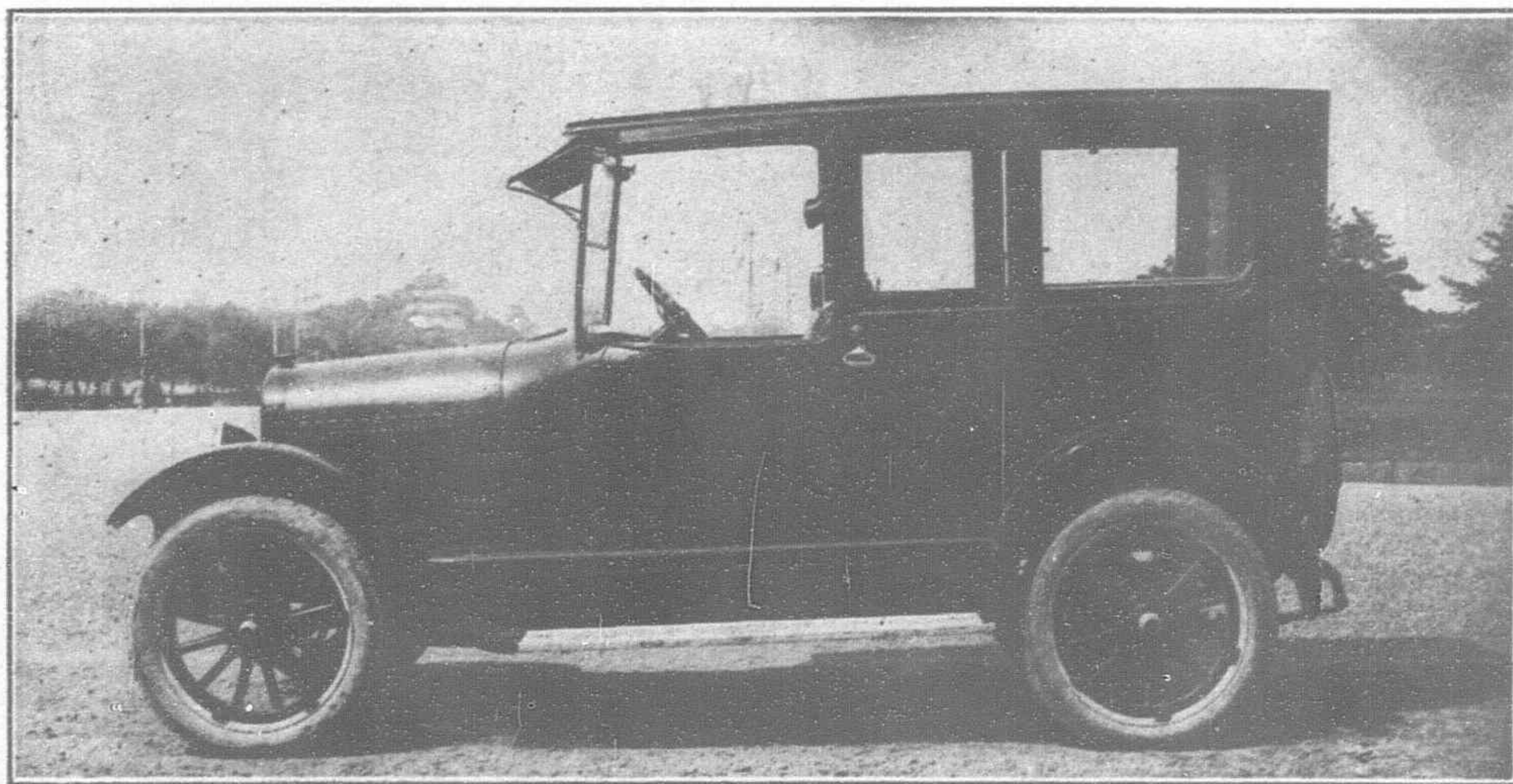
width of the chassis is 900-lbs. Equipped with electric starting and lighting, it sells for about Y.7,000 (G. \$3,500.00). The company also announces that it will assemble the 15 and 20 horse-power type.

"A far more important enterprise from the competitive point of view are the efforts of the Jitsuyo Jidosha Seizo Company, Ltd., of Osaka. Here is a company organized solely for the purpose of manufacturing a car especially suited to the operating conditions of Japan, which has erected a completely equipped automobile factory in which every single unit can and is, with a few minor exception, built. After two years of preparation and experiment, production has begun and if schedules are adhered to, serious competition will be offered American light cars, and fields as yet untouched will be opened.

"The company was organized two years ago through the efforts of an American automotive engineer. His original idea was to build a motor rickshaw but learning that passengers would not ride by the side of the driver he changed his ideas and designed the vehicle shown on page



Mitsubishi Kobe Works: Motor Shops.



Buick Limousine: Body Built by the Yanase Automobile Co., Ltd., Tokyo.

588. The company was organized with a capital of Y.1,250,000 and a site on the outskirts of Osaka was selected on which has been built a modern factory of the saw-tooth type of construction. The buildings are equipped with the latest automotive machine tools imported from America and there are now being made in the buildings parts which in America are ordinarily purchased in the open market, such as bolts, nuts, screws, etc. In addition to the ordinary machine tools such as lathes, stampers, drills, punches, milling machines, gear cutters, etc., the factory has its own forge and heat-treating furnaces, a completely equipped wood-working shop and a paint shop with a spraying machine. The only parts it purchases are tires, rims, spokes, carburetor, magnetos, lamps, generators, friction wheels, chains, sparkplugs and wiring. These are imported from the United States as are the cold rolled and alloy steels as the quality of the latter made in Japan does not meet the requirements of the company.

"Work on the factory was finished August 1921 and up to March 1922, there had been

produced 120 machines of which 100 were manufactured during the first three months of 1922. The production capacity is seventy a month and it is believed that this number will be produced regularly within a few months. At the time of the writer's inspection of the factory, production was being delayed by the failure to receive promptly the supply of friction wheels from America. It is the plan of the company to keep sufficient stocks ahead to prevent a similar occurrence in the future.

"The machine which is known as the 'Forham,' named after the designer, is a cycle car, two cylinders V-type air-cooled motor with a 3-inch bore and 4-inch stroke. It has a friction drive with chains to the rear wheels, with three forward speeds and one reverse with an emergency gear box cutting ratios in half, thus providing

three extra low speeds for hill climbing. The wheel base is 72 inches and the tread is 38 inches giving a turning radius of 12 feet on the four-wheel type and 9 inches on the three-wheel machine. The wheels are equipped with standard 28 by 3 American tires. The car has a speed of 30 miles an hour with a fuel consumption of 30 miles to the gallon which the designer says is equal to 50 miles on American roads. The weight of the car with body is 800-lbs. The selling price of the three-wheel type with passenger body is Y.1,550 (G. \$750.00) and Y.1,650 (G. \$850.00) for the four-wheel type. Several type of delivery bodies are made which sell for Y.1,450 (G. \$725.00). The selling prices appear to have little relation to the cost of production, and it seems certain that the company has in mind to undersell a popular American car which has been most successful in the country districts.

"A test ride proved the adaptability of the car to road and traffic conditions but also demonstrated that it was very uncomfortable, that it is very noisy and that gear changing was accompanied by jerks. The riding quality was not equal to any American car and this was admitted by the designer who maintains that the car will not compete against the average American car as it was designed to supply a need for a fast vehicle on the narrow roads of the interior.

"At the time of the inspection no selling organization had been completed, the attitude of the directors being to make a number first and then build a selling organization. A few cars had been shipped to Tokyo and sold but the car by no means was being pushed by sales campaigns. Until the army annual test held in May of this year it was not generally known among the Tokyo dealers. Its appearance at the test was a surprise to many.

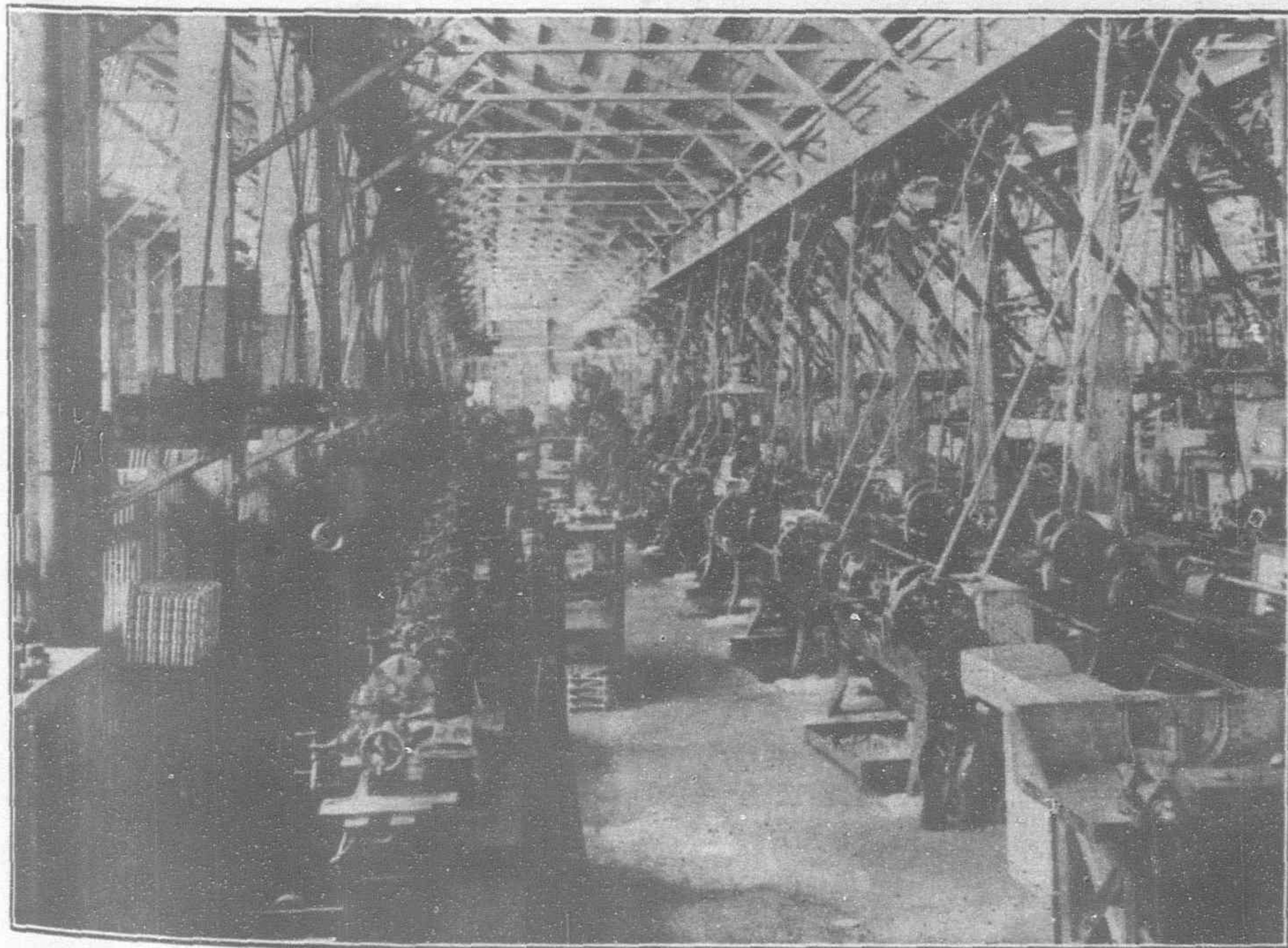
"Whether the company will be able to go forward is an open question. The designer and his assistant, who are also in charge of production, have been working under a contract which will expire in a few months and it debatable whether it will be renewed. The contract called for the designing of the car, the supervision of the erection of the plant and the starting of production. Now that these have been done the owners are anxious to take full charge and place Japanese engineers in the executive positions and be responsible for



New Building of the Yanase Automobile Company, Ltd. Tokyo; showing 4 Buicks Model 22-49 delivered to the Japanese Army and one Cadillac. Two-thirds of the ground floor space is devoted to showrooms and the rest to accessories and parts.

productions although the latter, it is said, have had no experience in automotive machine production. The Americans tell a highly interesting story of the trials and tribulations of getting the plant under way and even at the present time they are compelled by necessity to 'take a hand' at work which requires extreme mechanical nicety. All the workmen have had to be trained as naturally there is a scarcity of skilled mechanics for automotive work. The present force has to be supervised very carefully. The engineers state that although individual wages are lower than for the same class of workmen in the U. S., a greater number are required to produce the same amount of work, so that there is little difference in labor costs. Unquestionably the enterprise will bear watching.

"Attempts have been made by others to manufacture but the ventures have not been successful. The Mitsubishi Internal Combustion Engine Manufacturing Co., Ltd., has erected a large modern plant at Nagoya for the major purpose of manufacturing aeroplane engines, it having secured the manufacturing rights of the Hispania-Suiza for Japan. This company is controlled by the Mitsubishi family, one of the two largest family firms in Japan, with ramifications that touch almost every activity in the country. At this plant, operating under a government subsidy, 20 trucks and 6 cars were manufactured about a year ago, but the cost was so far in excess of what vehicles of similar quality could be purchased in the open market that the manufacturing was discontinued. According to Dr. K. Ito, managing director of the company, who has made a very extensive study of production methods of automotive factories in America and Europe, the Japanese market does not warrant, at present time, the investment of capital in automotive manufacturing enterprises. To manufacture on a scale that would bring the unit cost down to a comparable figure with American makes would require a home consumption of at least 1,000 cars a year, a figure which seemed impossible of attainment for a single make for a long time. To make up this figure by exporting he did not think possible for the reason that a car which a Japanese company could sell for Y.3,000 (G. \$1,000.00) could not compete in quality successfully with American



Mitsubishi Kobe Works: Motor Shops.

THE SHIBAURA WORKS OF THE YANASE AUTOMOBILE CO., LTD.

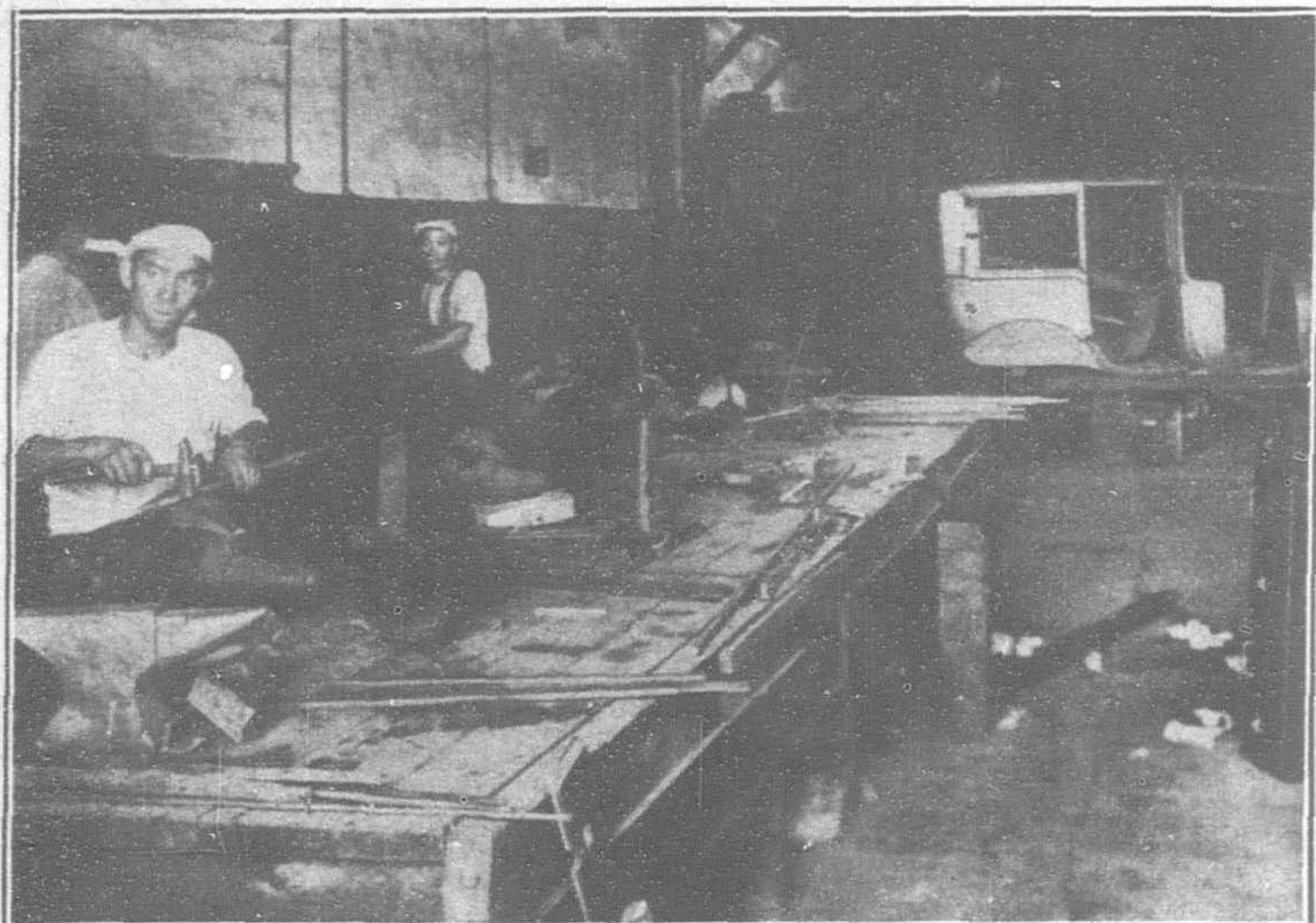
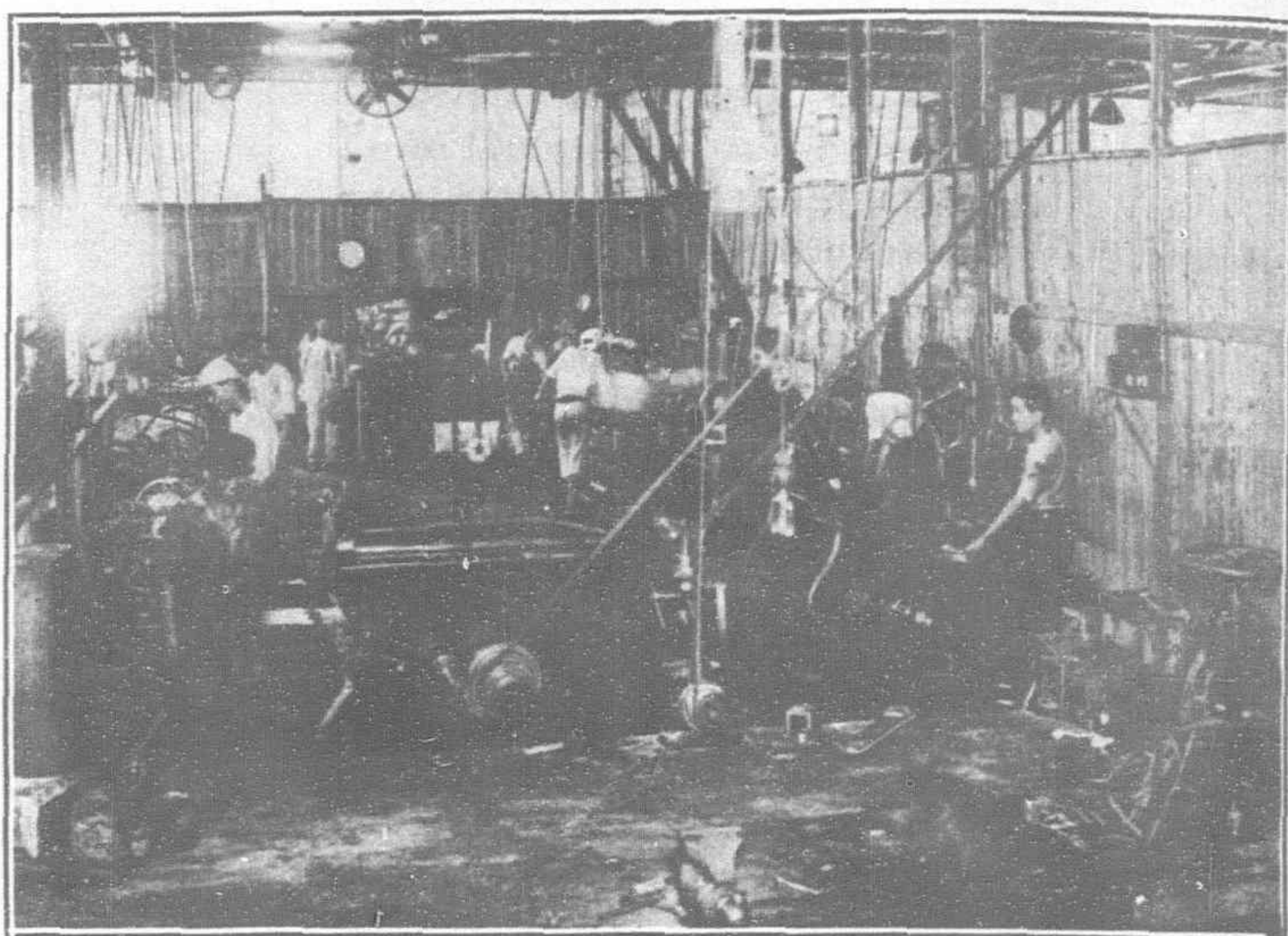
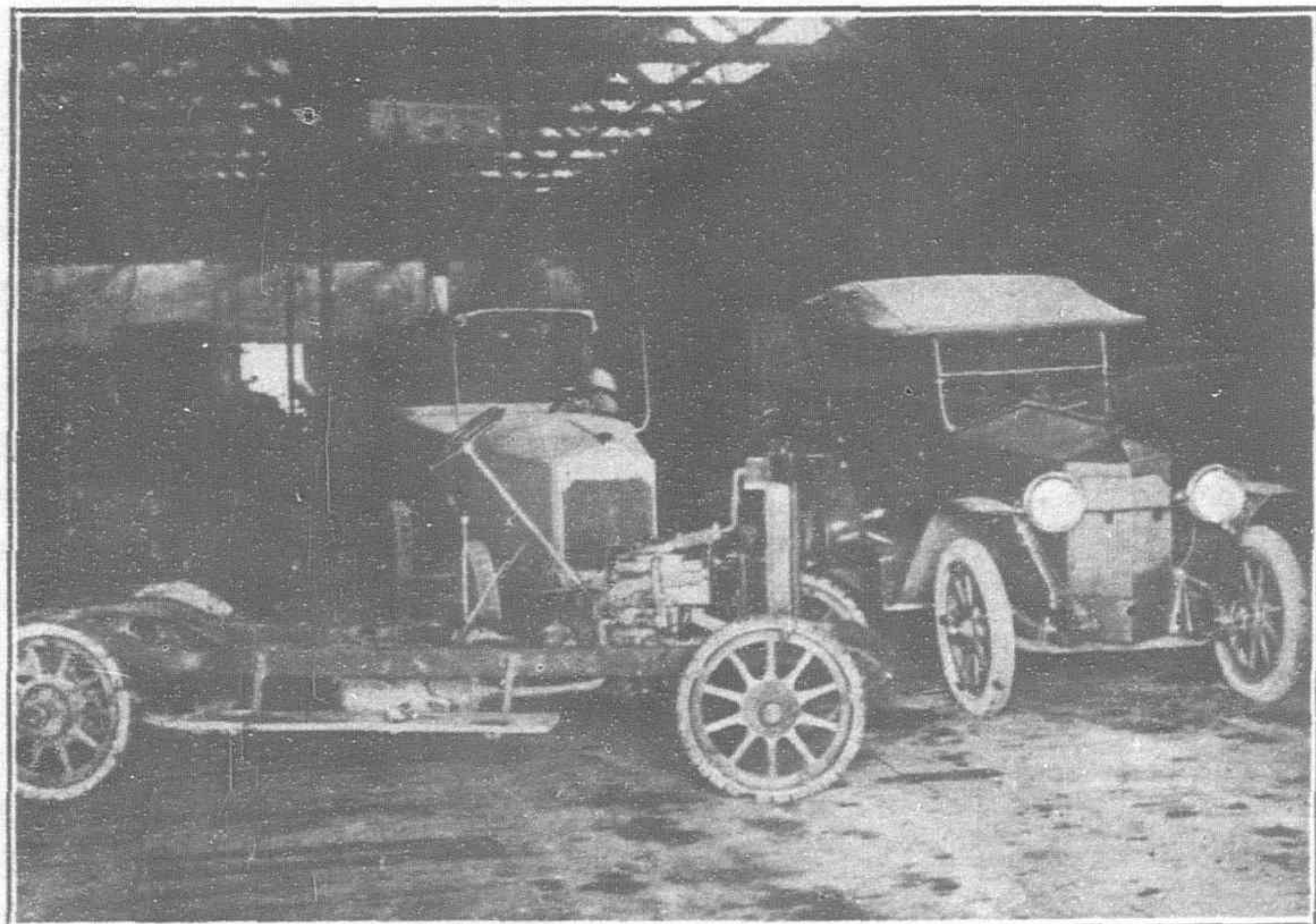


Plate Iron Shop.



Machine Shop, equipped with Universal Miller, lathes, drills, grinder, planer and boring machine.



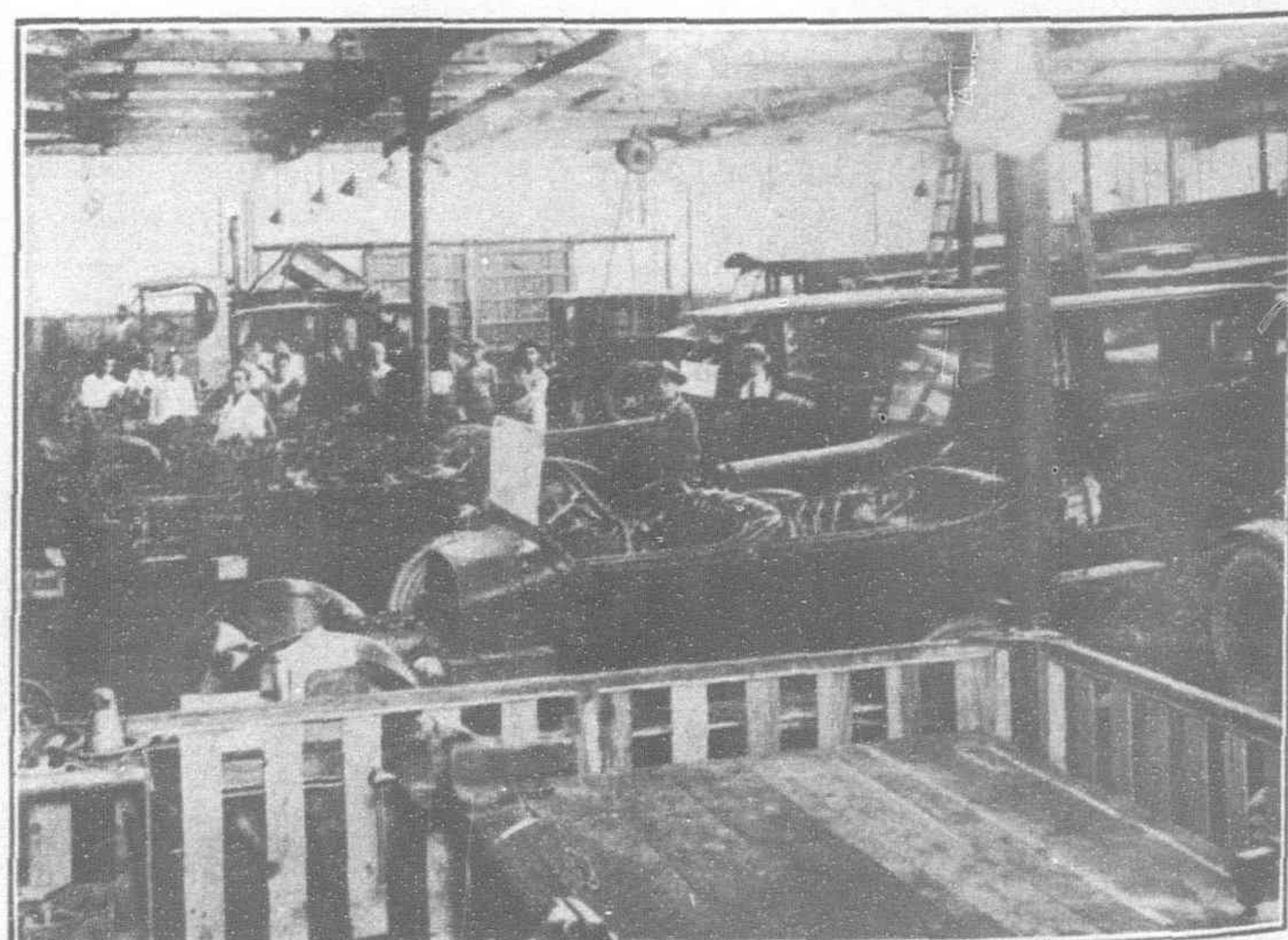
The Machine and Body of this Car was designed and manufactured by the Yanase Factory.



Body Building Shop.



Paint Shop.



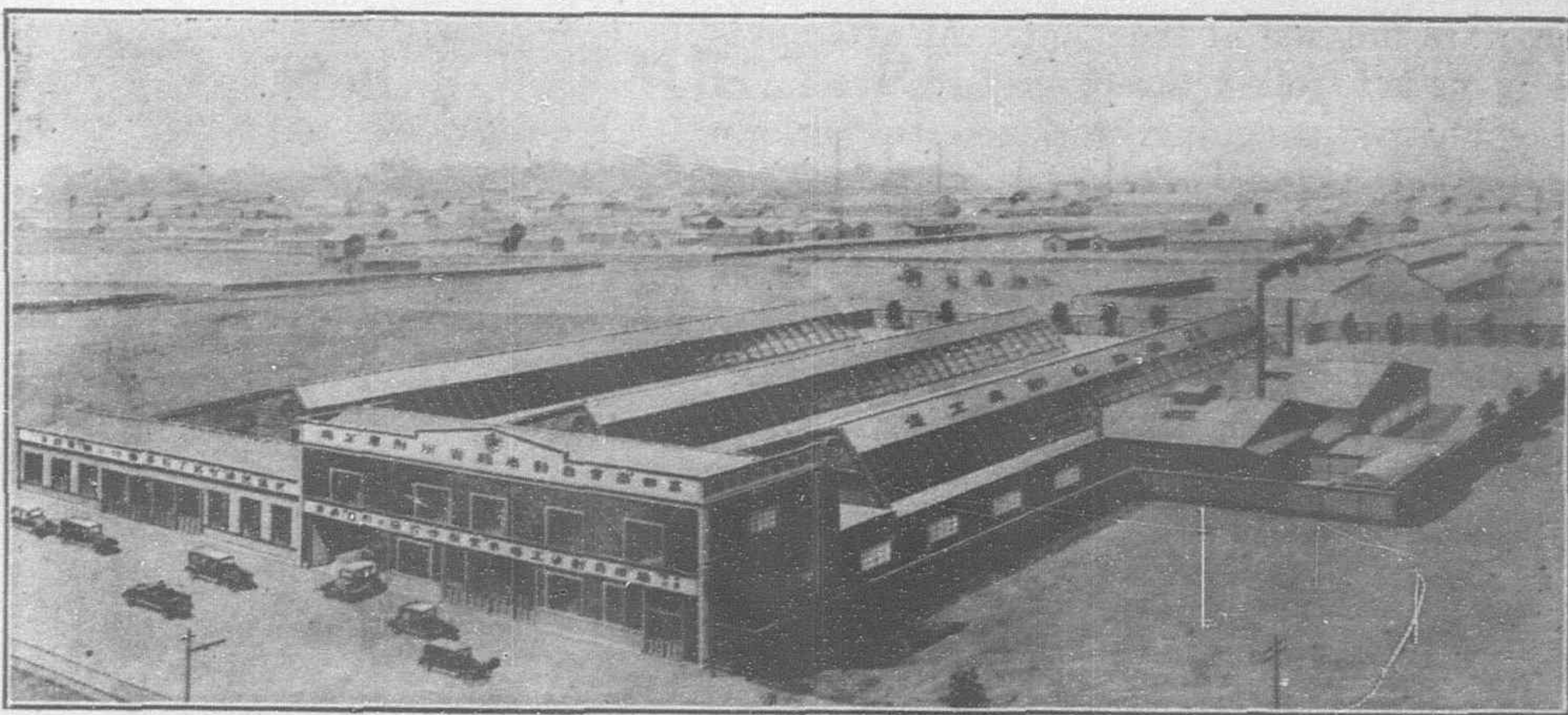
Repair Shop.

cars in the same price class. At the present time his company is confining its efforts to the manufacturing of aeroplane engines.

"The Tokyo Gas and Electric Co., which controls the agencies to a number of American and European vehicles, built under government subsidy, about 100 trucks for the army. These are of two-ton capacity and appear unusually heavy, almost clumsy. An executive of the company expressed the opinion that they were too heavy and did not compare with American vehicle, and were not altogether satisfactory. This appears to be borne out by the fact that the army is now a regular purchaser of American trucks and that the Tokyo Gas and Electric Co. has discontinued truck manufacturing and is concentrating its combustion engine work to the manufacturing of aeroplane engines, it having the Japanese right for manufacturing the Gnome engine. The company has a very large plant, about six miles from Tokyo, where it manufactures gas and electrical apparatus and measuring instruments. It is not, as its name might imply, a public utility company. The major interest in the company is supposed to be held by the Matsukata family.

"The Yanase Automobile Company is one of the largest distributing companies in Japan and controls a fine line of American cars and trucks. It was supposed to be manufacturing cars at the rate of 60 per year but investigation proved that but two cars had been made and none sold. This car is known as the "Y" light car and no attempt has been made to create anything original. It is a conventional four-cylinder engine cast in one block with three point suspension, valve in head with removable cylinder head. The bore is 3-in. with a 4.25 stroke developing 14 horse-power S. A. E. rating. The thermosyphon cooling system is employed with a tubular pointed radiator. Lubrication is affected by a constant level splash system operated by a gear pump. Other specifications are: Electric system—three unit, Delco ignition, Bijor generator and starting motor and high efficiency storage battery; clutch, cone type, leather faced; transmission—unit with engine, selective type, sliding gear with ratios third 1:1, second 1:2.04, first 1:3.2, reverse 1: 3.88, propeller shaft, bare shaft carries universal and slip joint at each end, torque rod equipped; rear axle, three-quarter floating, reduction of drive gear 4.23, adjustable pinion gear; brakes 10-in. diameter by $1\frac{1}{2}$ with drum attached to rear wheels, hand brake is internal expanding and foot brake external contracting, front axle, cast steel integral with yoke, steering left-hand drive, half nut gear type, turning radius 17-ft.: wheels, artillery type, demountable rim; springs semi-elliptic, front $1\frac{1}{2}$ -in. by 32-in., rear $1\frac{1}{2}$ -in. by 42-in. These specifications are furnished by the designer.

"The intention was to manufacture a car to sell for Y.3,000 (G. \$1,500) but the experimental work proved that the car could not be produced to sell for less than \$3,000. Mr. Yanase was very doubtful if more would be made, future production depending on the development of market conditions. The facilities of the company are not such as to lead one to believe that successful manufacturing could be carried on without the erection of a new factory, as the present plant was primarily laid out for the repairing of cars and building bodies. The efforts of the company for a long time may be discounted. It is supposed to have the support of the Mitsui family but this is an open question. The only connection discoverable is that the Yanase company is



Automobile Assembly Plant of Takata & Company, Shibaura, Tokyo.

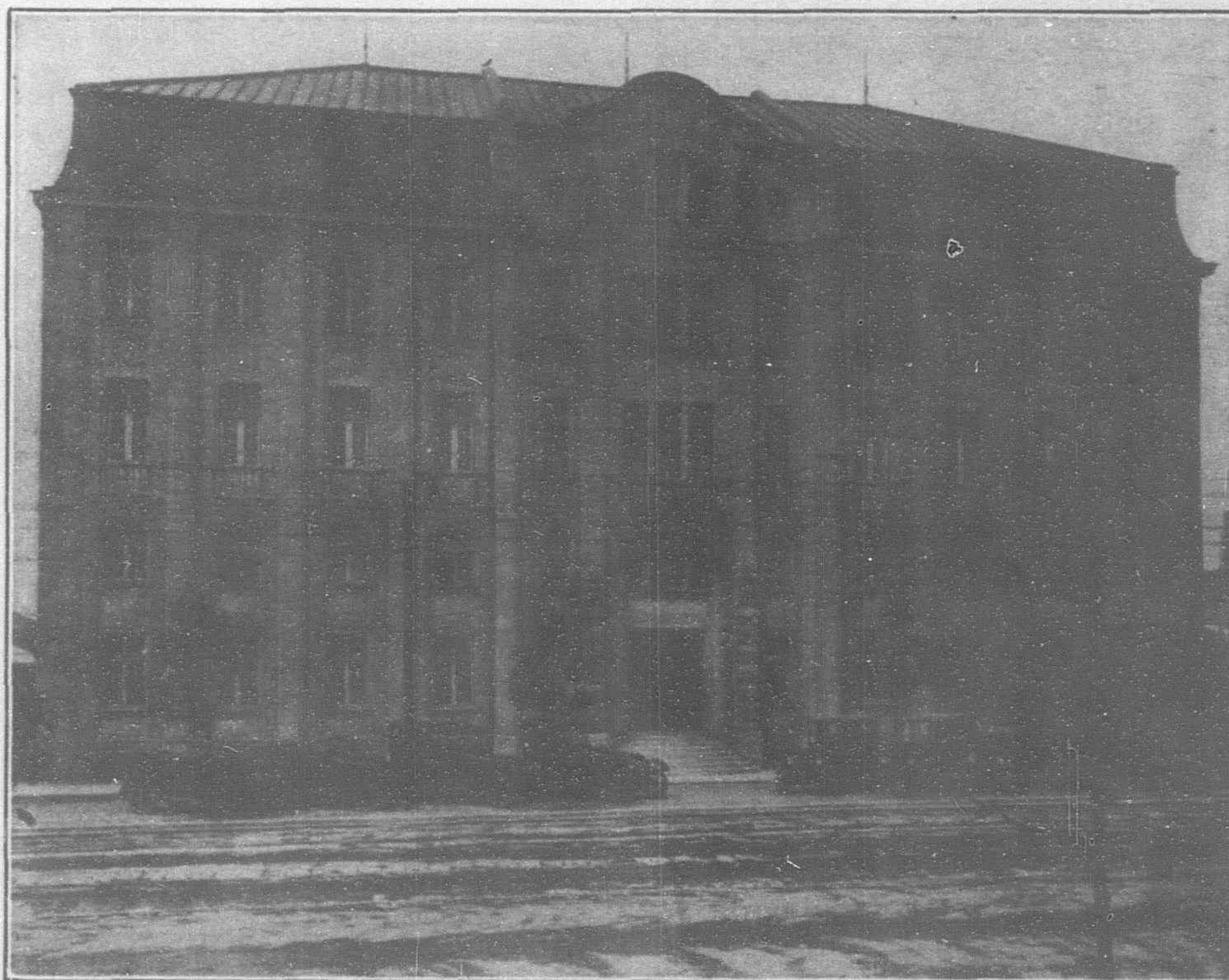
financed through the Mitsui Co.

"Trucks have been manufactured in army arsenals and, it is reported, by the Kawasaki Dockyard Co. of Kobe. At these places permission is not granted to make inspection but it is generally understood that the Kawasaki Co. is not manufacturing now, mainly for the reason that the subsidy granted by the government is not sufficient. As far as could be ascertained there is no manufacturing in Japan in order to get the benefits of the subsidy as it was found that the amount granted and the conditions under which it was granted were unsatisfactory.

"Two other companies have experimented with car assembly, but the results have never been placed on the market, and it can be assumed that aside from the efforts of the Jitsuye Hidosha Seizo Co. American manufacturers need not fear the competition of Japanese-built motor vehicles.

American Assembly in Japan

"At the present time but one American car is being regularly assembled at a plant in Yokohama. The cars are received in a knocked down condition with the engine and other large units already assembled. They are erected by Japanese workmen under the supervision of an American superintendent and a foreman from the American factory. Unassembled bodies are also received and



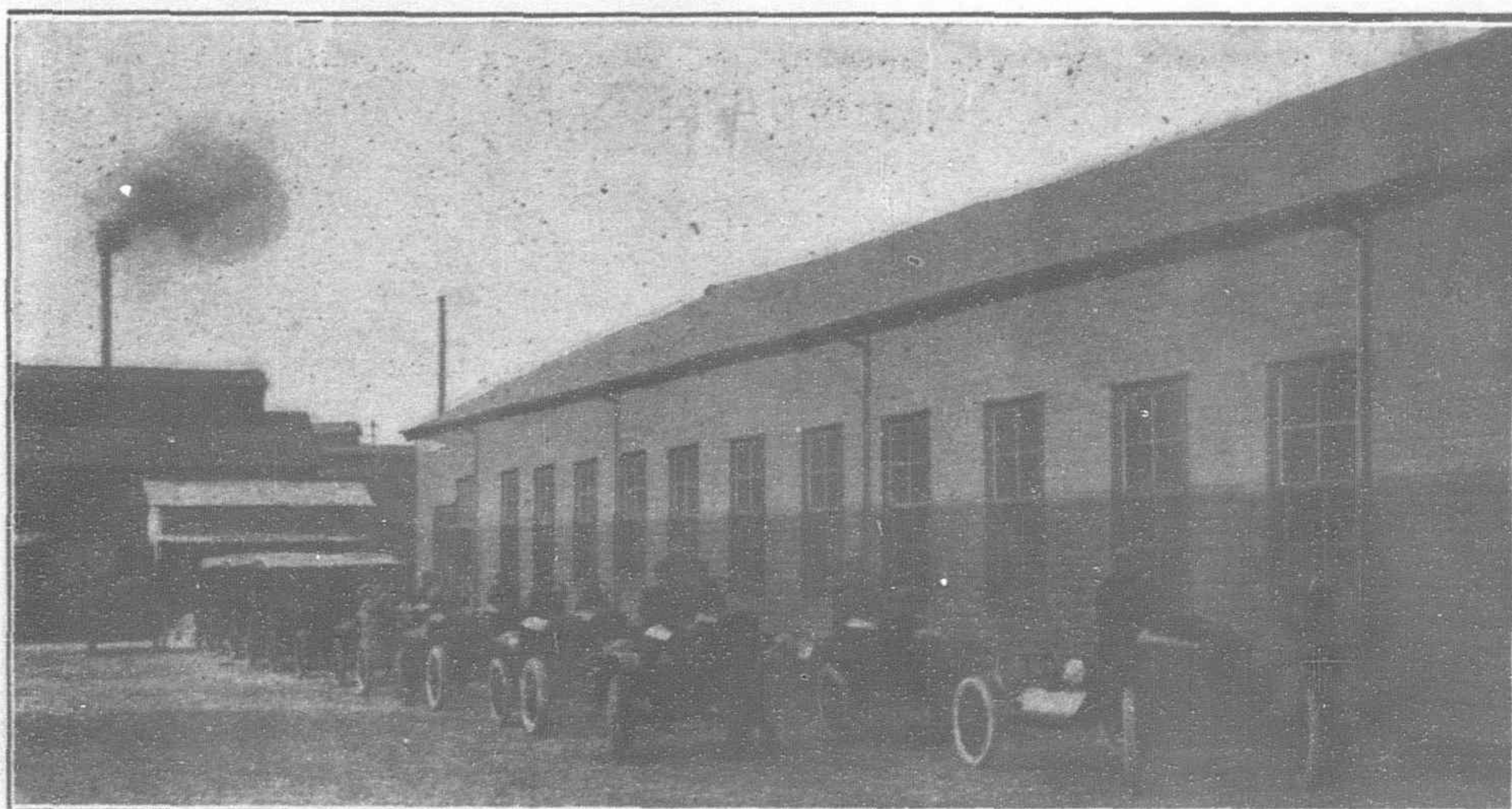
Magnificent new Office Building of Takata & Company, Tokyo, showing Cars owned by Company Officials.

these are finished at the plant. An attempt is being made to follow the progressive system of assembly by assigning workmen to perform limited operations. Conveyor belts are not being used in the plant, the cars being pushed along a raised track as is shown on page 589. From time to time the workmen are instructed on modern assembly work by motion pictures of the main plant in America. This also serves the purpose to check assumptions of complete knowledge, a tendency, which at times, was found difficult before the picture lessons were introduced. Skilled mechanics are never employed as usually they are hard to teach because of the belief that having worked in a machine shop or a garage they need no further instruction. Coolie labor is employed and with patience and a great deal of instruction the men become efficient.

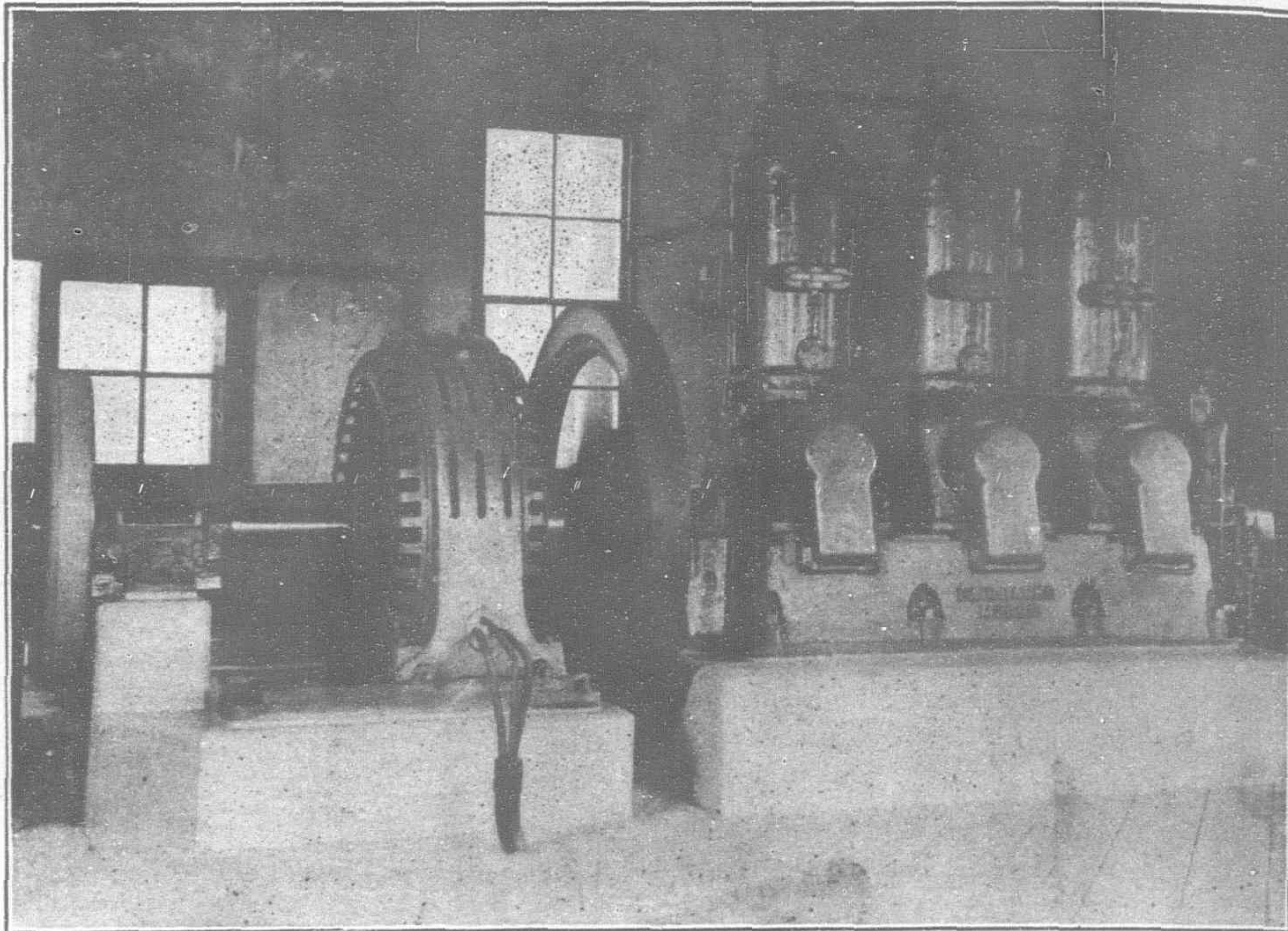
Several dealers have attempted assembly in a small way but have found that the expense of erection was greater than any saving affected. From the experience of the one successful company and those who have relinquished the idea it appears that assembly in Japan for that market alone is not justified unless at least 75 cars a month can be passed through the plant. But little can be saved on duty on each vehicle as cars partly disassembled can be imported on a basis of 25 per cent. *ad valorem*. It has been found that any possible savings which might be made by shipping quantities of each unit in single cases is more than offset by the expenditure of time and labor in the shipment. Various duties cover different parts and some of these are less than 25 per cent. but to pack and list these separately would require very elaborate billing and shipping instructions which is not justified by the saving. The distributors now assembling have looked thoroughly into the subject and have decided against it, and their experience can serve as a guide to others who might be contemplating such action. As to using Japan for the assembly of vehicles for the Far Eastern market, the writer is not prepared to say until the other markets have been surveyed. At present, however, assembly with the whole East in mind is not being done by any company, although it has been investigated by several.

Body Building in Japan

"Because of the saving which may be effected on freight, duty and interest charges on capital invested there has developed in Japan



Day's drive away of assembled Ford machines at the Negishi Plant.



The Power Plant of Sale and Frazar's Ford Assembly Plant at Negishi; 150 H.P. Fairbanks Morse Semi-Diesel Engine and Generator.

a body-building industry which is equal to meeting all the requirements of the market for car and truck bodies. But unlike the industry in America it is not specialized but has grown to its present proportions as an adjunct to the organization of the distributors. And by reason of its being a side line it imposes a burden on the parent industry which works to the disadvantage of both. Several dealers were frank enough to admit that their body-building establishments were run at a loss and agreed that cheaper and better bodies could be built by specialized shops.

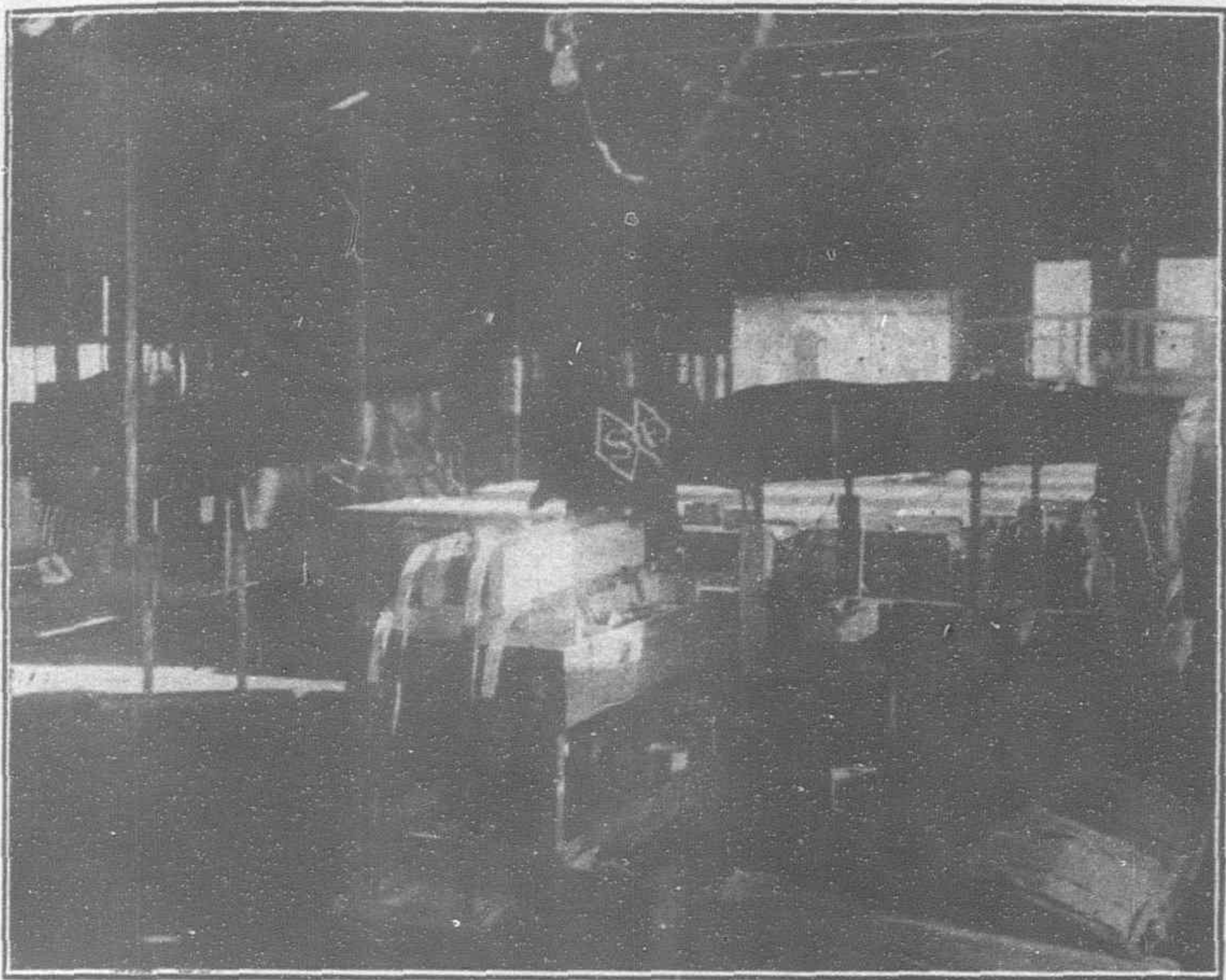
The size of the shops are in proportion to the volume of the dealer's sales. The great majority of the cars and trucks imported are brought into the country without bodies, the exception generally being to meet the small demand for open cars or the cultivated taste for high-class custom bodies for high price cars, for although Japanese bodies are attractive they fall short of meeting the high standard of the custom body builders in America and Europe.

The building devoted to body building are almost without exception of wood with unpaved floors and without adequate machinery. The majority of the bodies are built of wood, although a demand is growing for metal bodies owing to the comparatively short life of wooden bodies which rarely present a good appearance after the second year due principally to warping and varnish cracks.

The cause of this is the absence of kiln dried lumber, and the excessive amount of rain. It is probable that the use of metal bodies will increase, two plants now being equipped with metal working machinery. Curiously, even in the shops where modern machinery is used, laborers can be seen working with antiquated hand tools such as the adz, one way saws and scrapers.

A fairly hard wood is used which lends itself readily to being worked to a smooth finish. Practically all bodies made in Japan are of the limousine type built to accommodate five people inside. The interiors are well finished and compare favorably with the average American job of the same type. Bedford cord is used in upholstery and there are the usual accessories to comfort such as speaking tube, arm rests, flower holder, ash receiver and

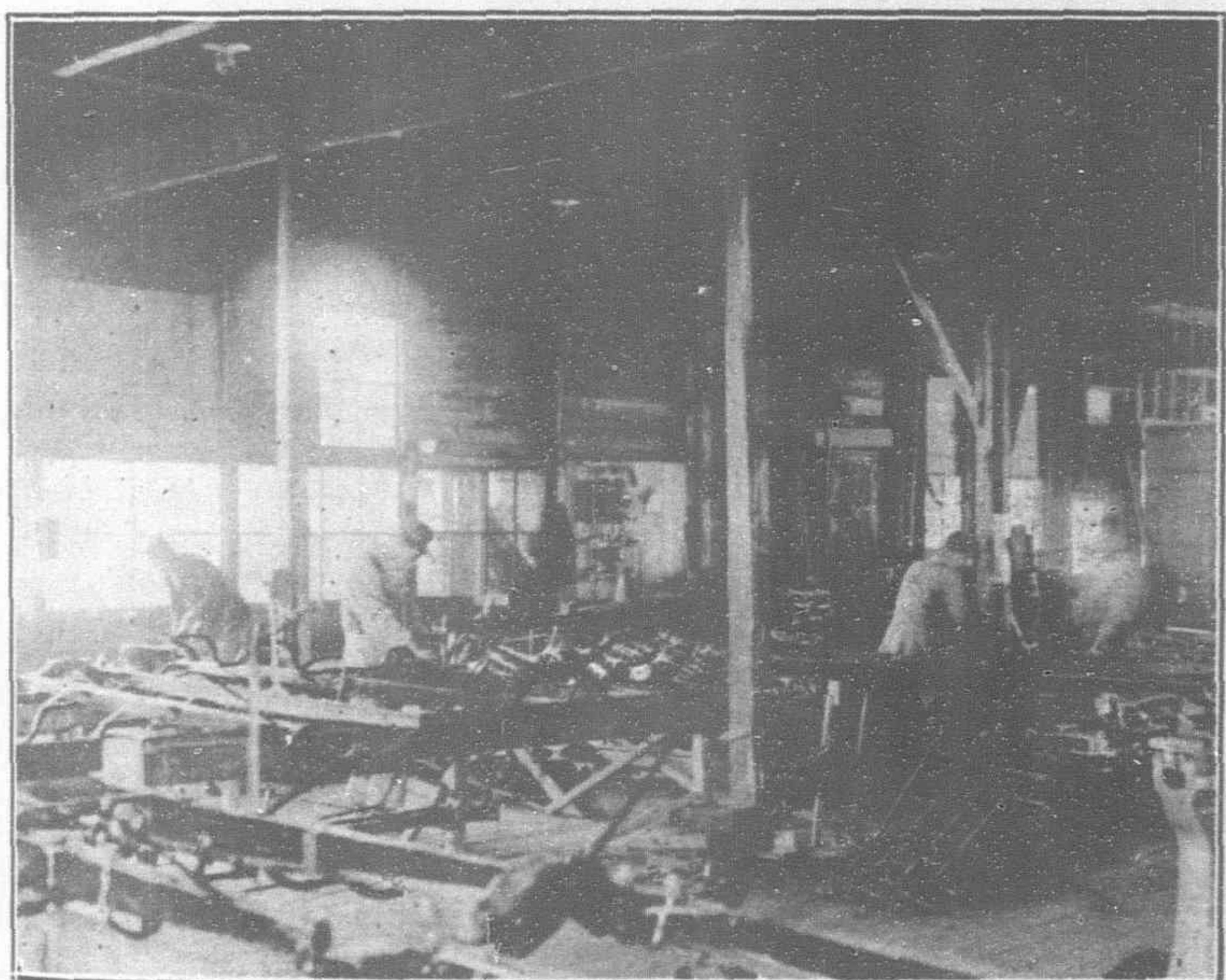
SALE AND FRAZAR'S FORD ASSEMBLY PLANT AT NEGISHI, YOKOHAMA



Top and Wind Shield Assembly.



Paint Shop.



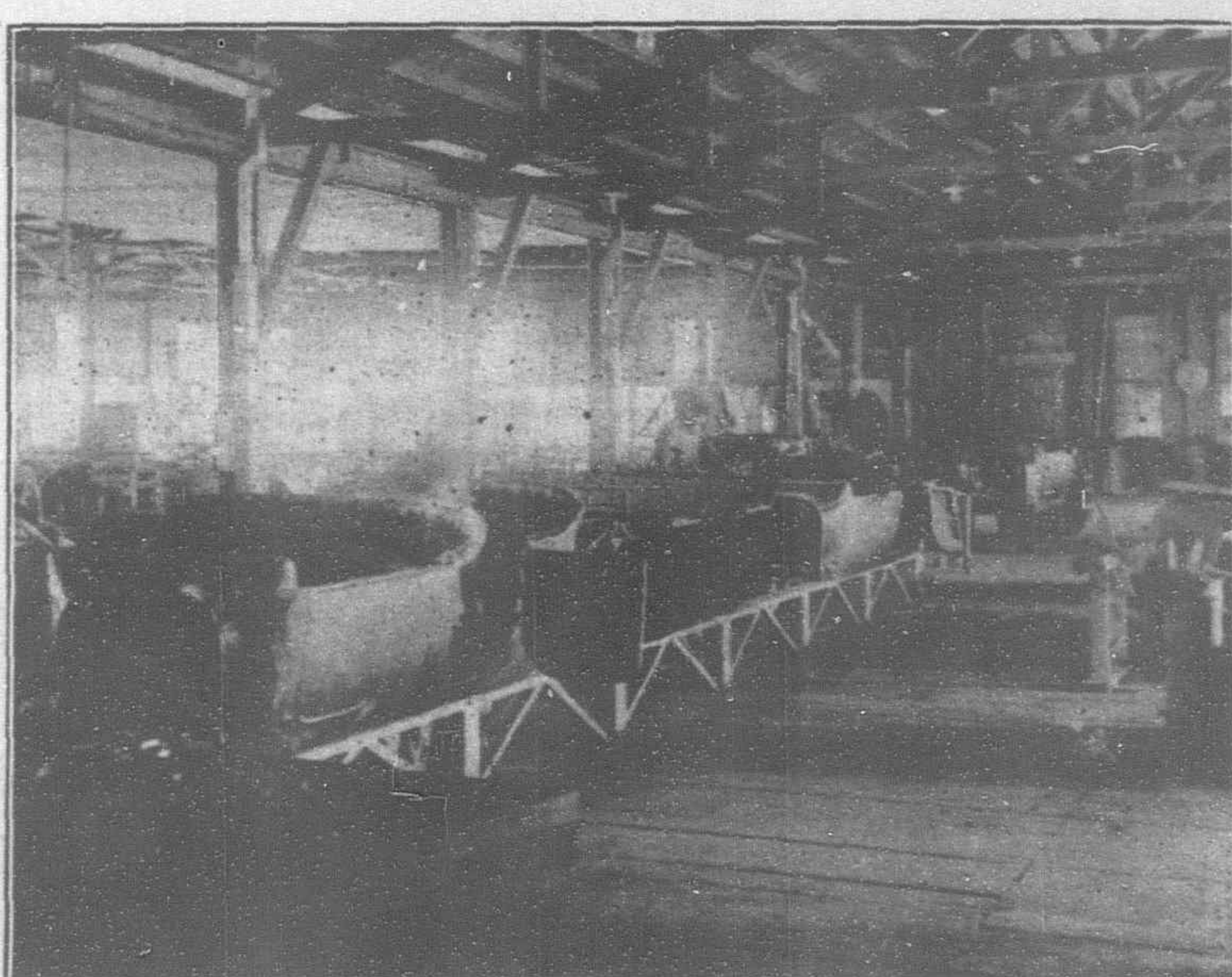
Rear Axle Assembly.



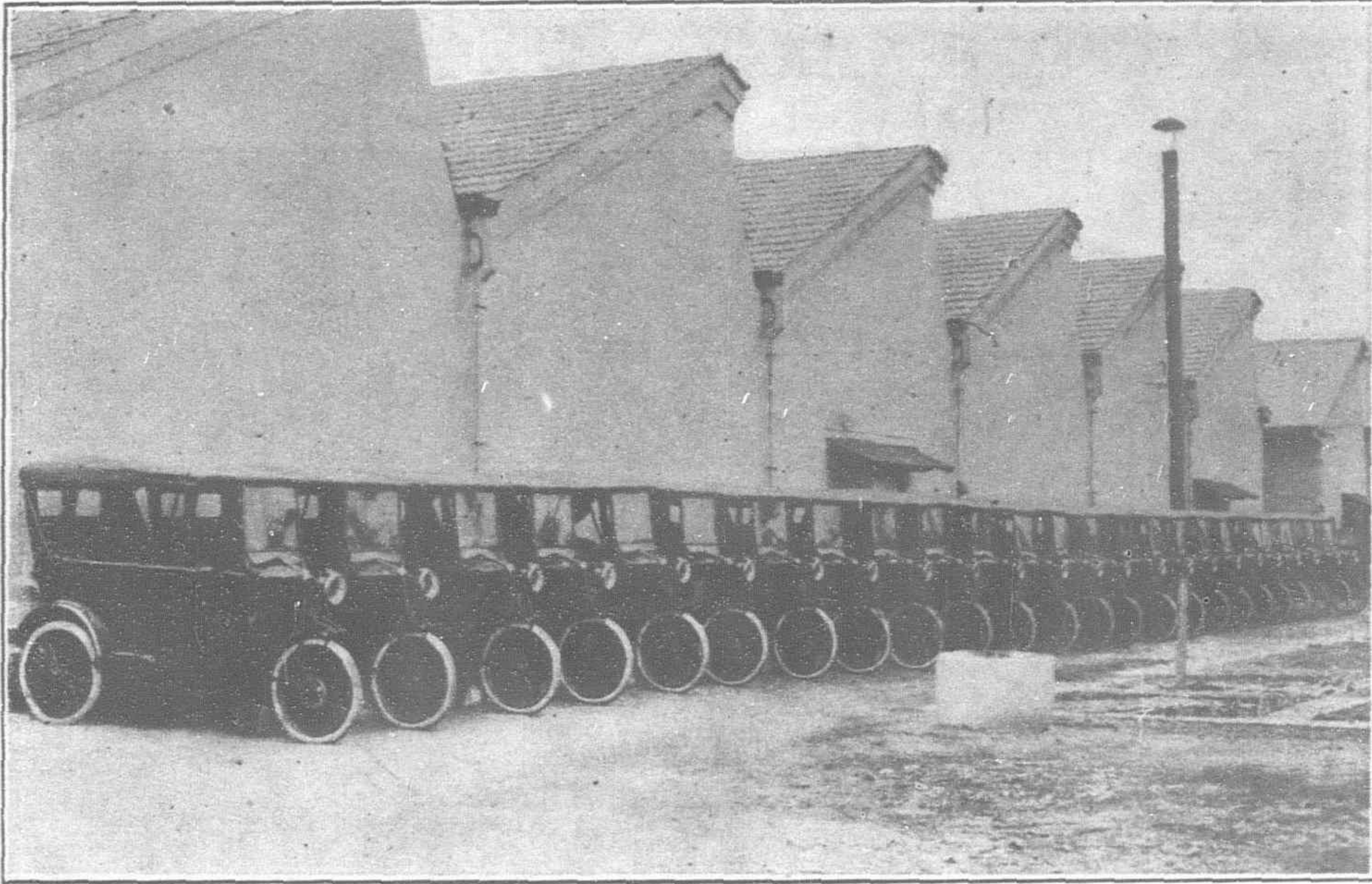
Progressive Assembly.



Battery Charging Room.



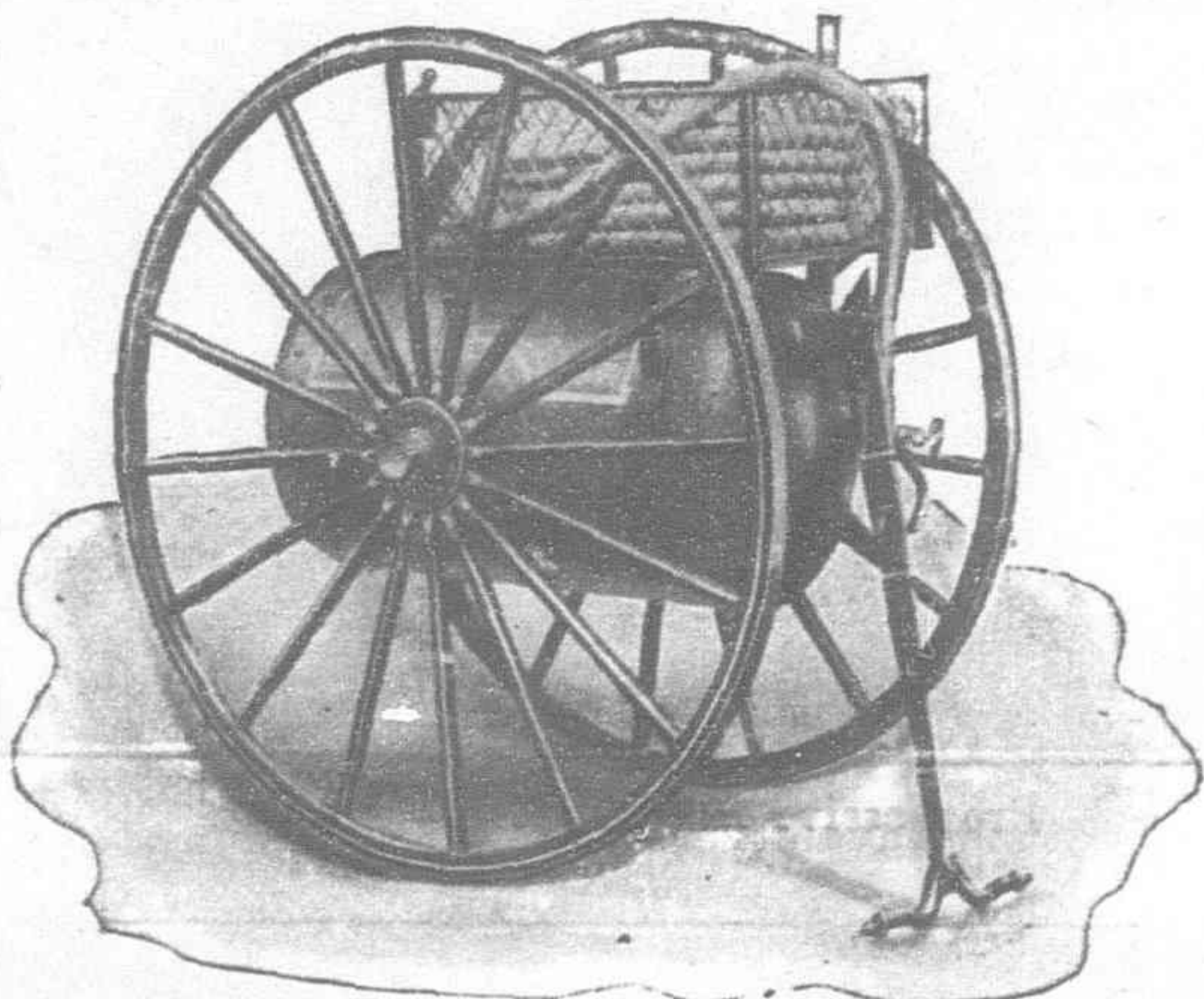
Body Assembly.



Jitsuyo Automobiles Ready for Shipment outside the works of the Jitsuyo Jidosha Seizo Company at Osaka.

silk curtains to match the upholstery. The bodies are finished with Japanese lacquer. From six to twenty-four coats are applied, and prices range from \$750 to 1,500. The average price is about \$1,000 for a body comparable to what is generally furnished on a medium price American car. Truck bodies to meet special requirements can and are occasionally built but as a rule, standard platform and stake bodies are supplied which cost approximately \$300.00. A standard buss body with aisle seats to accommodate 12 passengers is furnished for \$1,000. The bodies of busses are usually crudely finished.

There is unquestionably an opportunity for the organization of an efficiently equipped and managed body-building plant and it would be to the best interests of the dealers to turn their work over to it for under the present practice of separate body-building plants an unnecessary amount of capital is required to conduct a motor distributing agency thereby limiting not only the operations of present dealers but serving to check new capital."



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Motors and Roads in the N. E. I.

Working Results of the State Railway Motor Services

By L. C. Blochman

THE general state of a country's business can generally be judged by the state of the second-hand car market. The depression caused in Java by the fall in rubber, sugar and coffee is plainly reflected in the number of used automobiles which can be bought for ridiculous

prices to-day. Some dealers, caught with large stocks of new cars, are putting their surplus stock into taxi service. Several new "for hire" establishments have sprung up in Batavia, Semarang and Sourabaya since the demand for motor cars has dropped off.

Java dealers look for a revival of the automobile business at the first signs of better general conditions. There are already 18,700 cars registered in Java, 85 per cent. of which are of American make. Medium-priced cars are in great predominance, most of the American quoto being drawn from the Ford, Dodge, Buick, Chevrolet, Oakland, Hudson and Essex. Among the European machines, the Fiat leads the list, with the Citroen, Wolseley and Minerva in close competition. The Swiss Pic-Pic, the Mercedes and the Austrian Daimler are also finding some sale.

German competition is difficult to meet in price, but shipments cannot be guaranteed on account of the enormous demand for the cheaper cars. Prices also fluctuate with the varied career of the mark, and only Java firms with buyers in Europe can purchase German cars at a price which is not liable to change between mails. No European cars are able to compete with American makes in hill climbing. Inasmuch as most of the roads in Java are through mountainous regions, the superior power on an incline

gives U.S. cars a big advantage. The prevalence of hills, together with the high cost of fuel, makes a light car the only kind that has a universal sale in the island.

Java boasts 10,000 miles of motor roads, in good condition and all posted after the French system by the Java Motor Club.

The general road plan, the system under government supervision, includes two roads across the island from east to west along the north and south coasts, and five cross roads. As originally planned, the completed system was to cost 5,000,000 guilders, but increased costs in both labor and material have boosted the estimate to 8,533,000 guilders. At the end of 1921, 4,077,000 had already been expended. The provincial plan, which is being carried out by the individual provinces in connection with the general plan, was to have been completed in ten years at a cost of 24,000,000 guilders. A new estimate will place the final expenditure nearer to 40,000,000.



Penang Gate in Batavia (Lower Town)

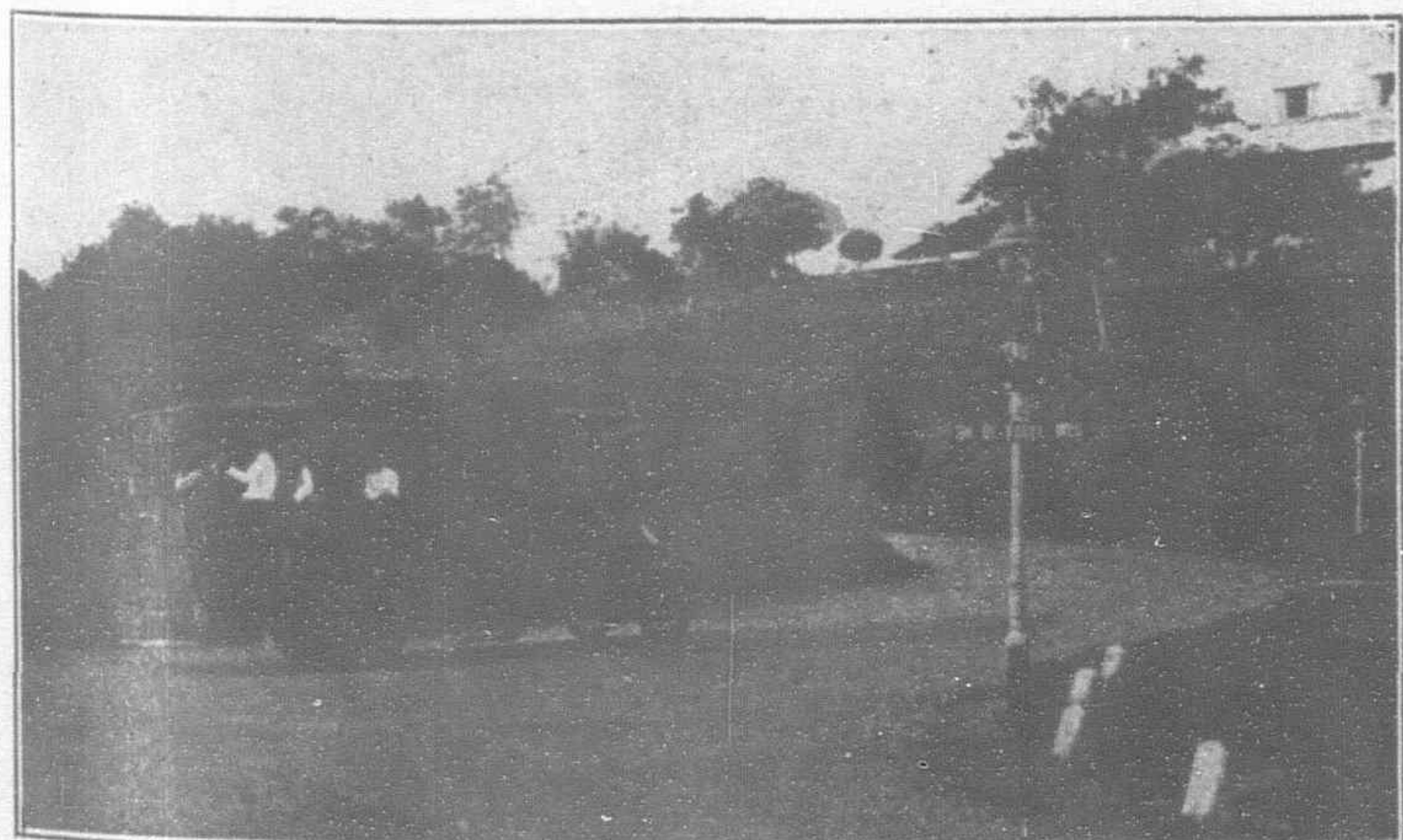
A glance at the table found at the end of this article shows that Java received less than 20 per cent. of the 1921 appropriation for the construction and repair of roads and bridges throughout the Dutch East Indies. As a matter of fact, efforts to develop the outlying possessions have called for great expenditure on highways. In many places, the Java state railways have established auto services to reach territory not served by rail connections. This is particularly true in Sumatra, which has received the lion's share of the appropriation for the outlying islands.

At the end of 1918 there were nine roads completed and 17 building, with an expenditure of 15,630,000 guilders. At the end of 1921, 12 roads had been finished, 18 were still in the process of construction, and the total expenditure had reached approximately 19,000,000 guilders.

The following figures show the expenditure (in guilders) on roads and bridges in the Dutch East Indies for the past six years:—

Expended for the Construction and Renewal of Roads and Bridges (Guilders)

			Java	Outlying Possessions	Total.
1916	..	..	1,402,234	3,542,962	4,945,196
1917	..	..	1,938,014	3,843,346	5,781,360
1918	..	..	1,738,587	3,889,580	5,628,167
1919	..	..	1,820,772	4,636,063	6,456,835
1920	..	..	1,402,659	6,014,803	7,417,462
1921	..	..	1,264,037	6,849,599	8,113,636



Motor Bus in the N. E. I.

State Railway Motor Services

Foremost in the development of motor transportation in the Netherlands East Indies is the road motor department of the state railways which is constantly extending its services into districts which the railway cannot reach. At present, road construction with its attendant motor bus service is being pushed more intensively in Sumatra than elsewhere in the N.E.I. The general road program for that island embraces the construction of 54 roads with a total length of 4,600 kilometres estimated to cost Guilders 63,000,000. The object of this system is to give access to and open up the remarkably rich agricultural and timber lands in the interior. Wherever practicable the roads are being supplemented by motor boat navigation on the rivers and lakes.

By the end of 1921 the states railways were operating five district motor services in various parts of the archipelago, with a total of 3,100,000 car kilometres run during the year, of which, 1,920,727 car kilometres were run by goods trucks and 1,179,605 kilometres for passenger traffic. The working results of these various motor service divisions for 1921 are as follows:

1. SUMATRA'S WEST COAST AND TAPANOELI SERVICE

Manager's Residence, Fort de Kock:

No. of kilometres run by goods motors 446,962

No. of kilometres run by passenger motors 440,278

Receipts: 1920, F. 552,813; 1921, Fl. 637,506.

Expenditures: General charges, Fl. 38,333; Traffic expenses, 70,060; Running expenses, 46,664; Maintenance and repairs, 74,044; Other working expenses, 192,338; Renewals, 1,689; Total, Fl. 423,128. In 1920, 383,228.

Capital Account:

Balance from 1920 .. Fl. 395,038.30
Additions in 1921 .. 128,410.05

523,448.35

Depreciation in 1921.. 83,616.78

Balance, Dec. 31, 1921.. 439,831.57

Provisional Balance Sheet, 1921:

Income: Passengers, Fl. 404,969.62; Goods, 138,274.35; Miscellaneous, 9,569.05; Value of stock, December 31, 1921, Fl. 144,414.12; Total, Fl. 697,727.14.

Expenditure: General charges, Fl. 81,757.26; Traffic expenses, 70,060.46; Running expenses, 300,435.69; Value of stock, January 1, 1921, 108,177; Balance, 137,296.77; Total, 697,727.14.

Net Revenue Account: Interest on capital expenditure, Fl. 22,962.17; Depreciation, 60,616.78; Net profit, 53,716.82; Total, 137,296.77.

During September this service was extended beyond Sipirok (in Tapanoeli) as far as Sipogoe. During the rainy season the service was greatly handicapped by landslips on the mountain roads, while the service to Pematang Siantar could not be started because the metalling of the road had not been completed.

2. BENKOELLEN MOTOR SERVICE

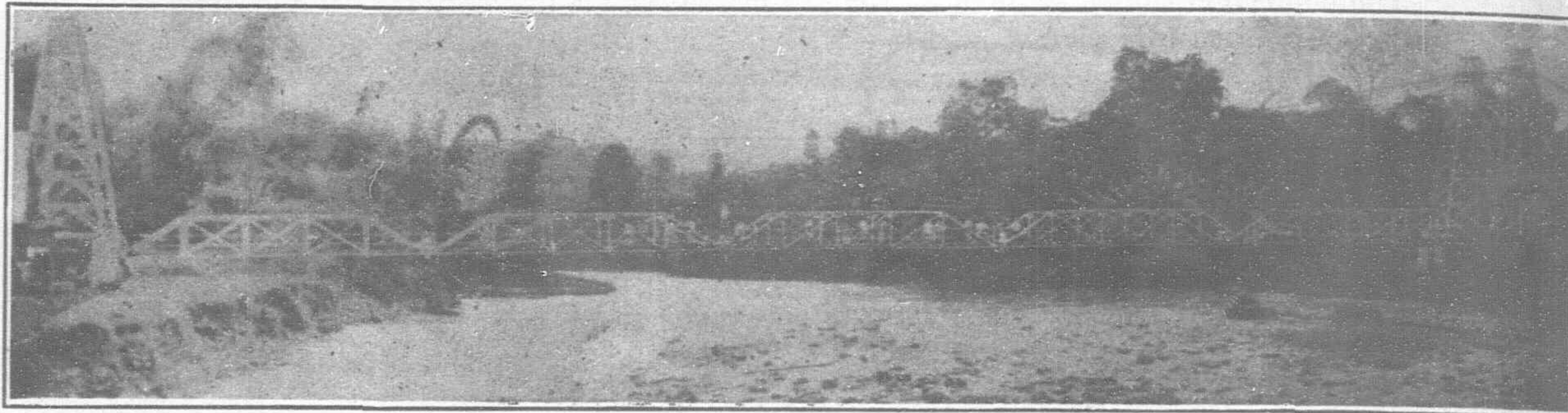
Manager's Residence, Benkoelen:

No. of kilometres run by goods motors 571,121

No. of Kilometres run by passenger motors .. 347,428

Receipts: 1920, Fl. 600,810; 1921, 469,810.

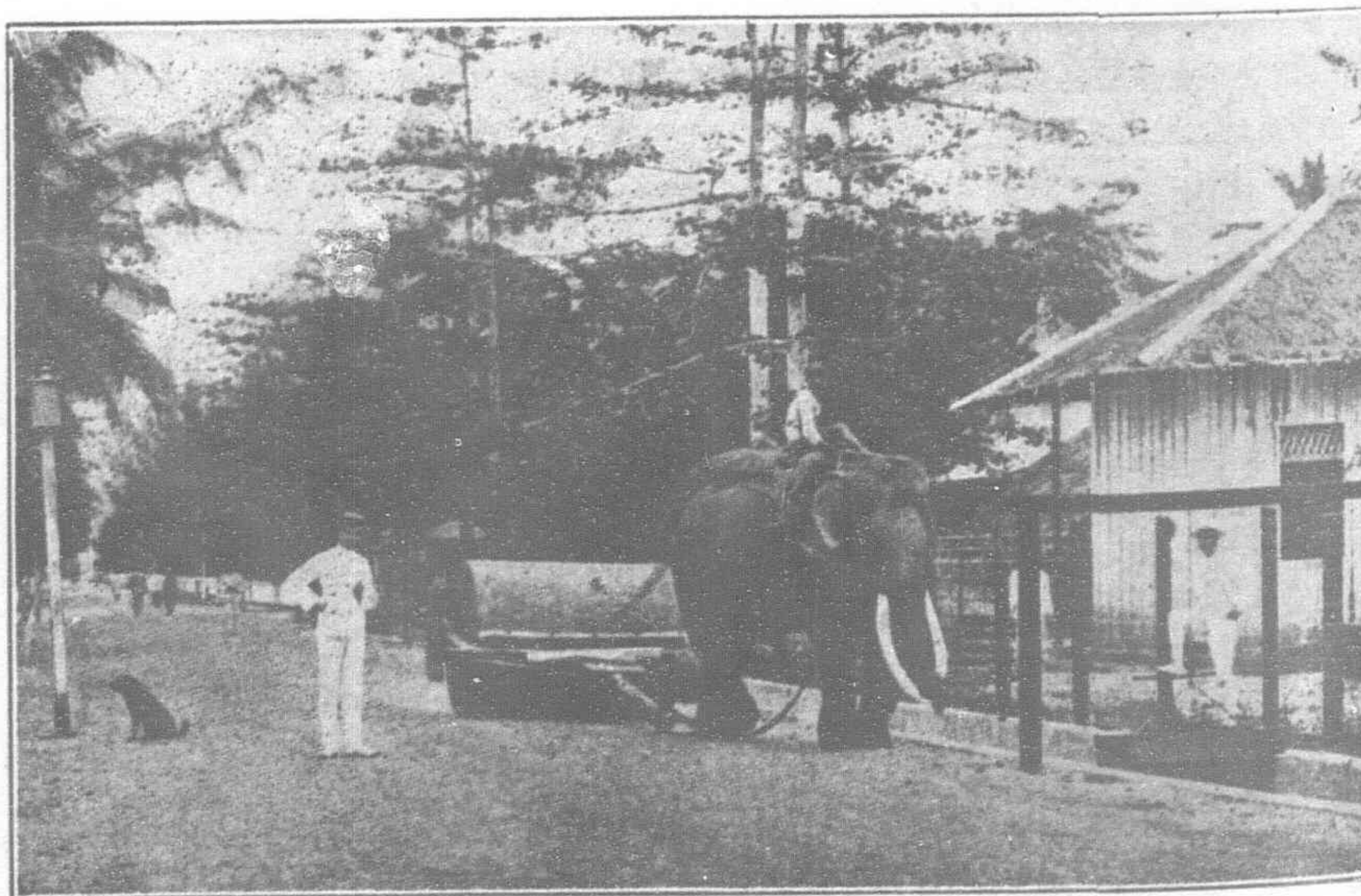
Expenditures: 1921, General charges, Fl. 42,212; Traffic expenses, 70,826; Running, 60,890; Maintenance and repairs, 161,888; Other working expenses, 175,969; Renewals, 4,930; Total, 516,715. In 1920, 565,015.



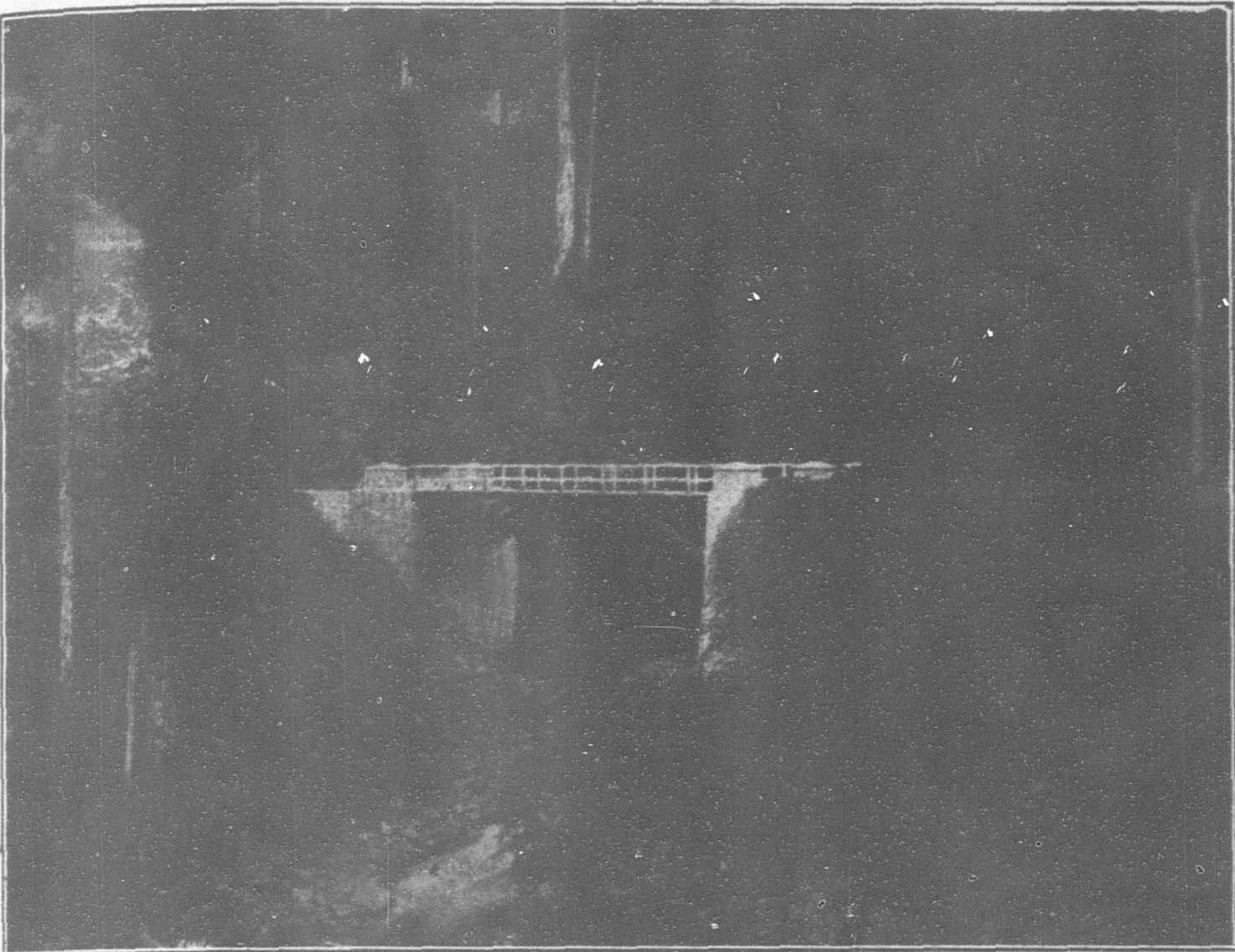
Cable Bridge on the Tjoeroen-Moera Aman Highway, Benkoelen Province



Seventeen Fageol Trucks on their Way to Delivery to the Government in Java—Each of the Trucks Carries Another in a Crate



A Road Roller at Work in Pangkalan Brandan, Sumatra



Bridge on the Main Road to the Gajoe District of Atchin, North Coast of Sumatra

<i>Capital Account</i> : Balance from 1920	Fl.491,689.89
Additions in 1921	43,088
	<hr/>
	534,777.89
Depreciation, 1921	130,862.03
	<hr/>
Balance, December 31, 1921	403,915.86

<i>Receipts</i> : 1920, Fl. 663,998 ; 1921, 584,486.	
<i>Capital Account</i> : Balance from 1920	Fl.384,421.31
Additions, 1922	14,741.33
	<hr/>
	399,162.64
Depreciation, 1921	105,038.02
	<hr/>
Balance, December 31, 1921	294,124.62

Provisional Balance Sheet, 1921 :

Income: Passengers, 233,510; Goods, 230,430; Others, 5,120; Value of stock, December 31, 1921, 184,820.86; Balance, 65,953.68; Total, 719,834.54.

Expenditure : General charges, 84,986.13; Traffic expenses, 70,826.46; Running, 396,390.95; Value of stock, January 1, 1921, 167,631; Total, 719,834.54.

Net Revenue Account : Balance from income and expenditure account, 65,953.68; Interest on capital exp., 25,661.70; Depreciation, 70,612.03.

Net Loss : Fl. 162,227.41.

This service experienced a strike of drivers and garage men because of strict supervision, but was kept open by the European staff. The service was extended during February beyond Moera-enim as far as Tambang Sawah, government gold fields.

3. PALEMBANG MOTOR SERVICE

Manager's Residence Morea-enim :

No. of kilometres run by goods motors	Fl.545,918
No. of kilometres run by passenger motors	268,272

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11.4 h.p. 2-Seater (with double Dickey Seat)	
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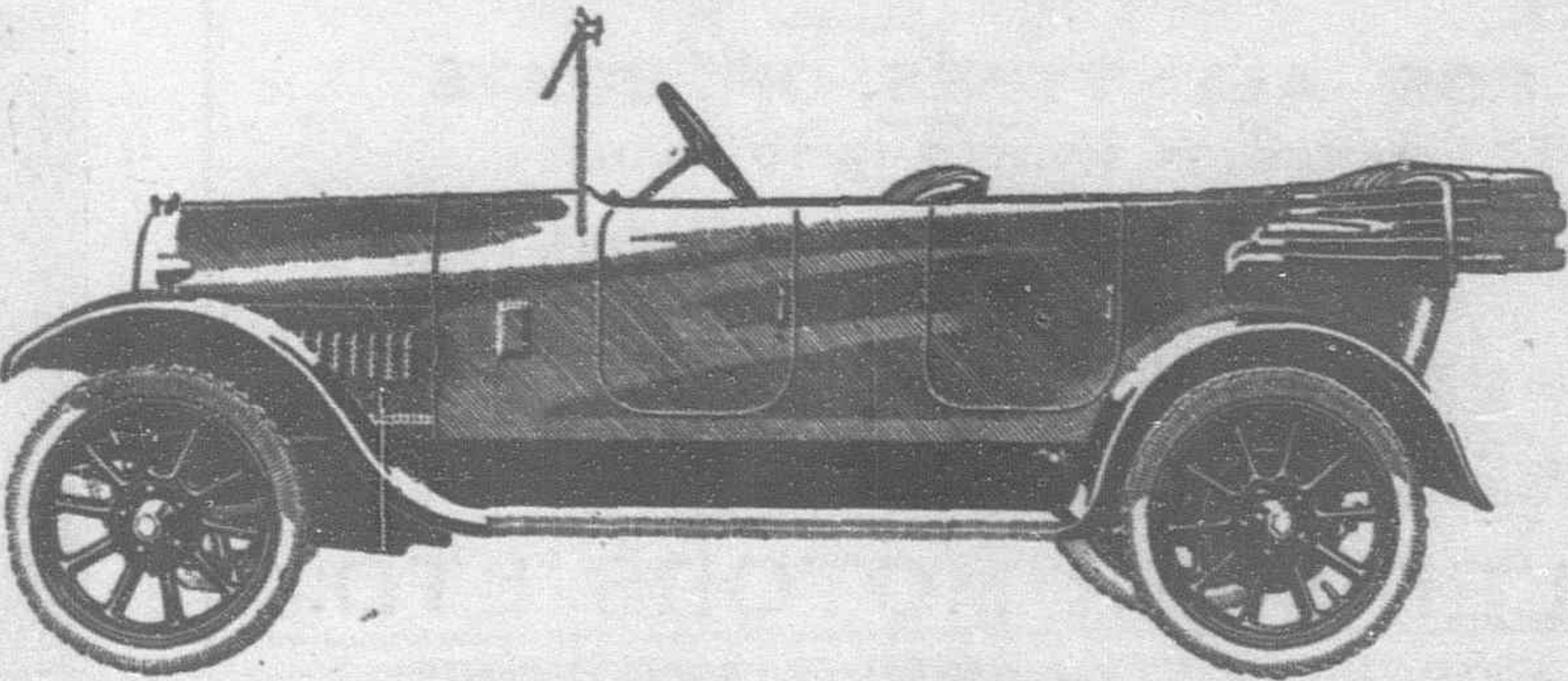
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Provisional Balance Sheet, 1921 :

Income : Passengers, 316,826.58 ; Goods, 250,515.54 ; Others, 17,143.48 ; Value of stock, December 31, 1921, 298,384.73 ; Balance, 45,277.98 ; Total, 928,148.31.

Expenditures : General charges, 111,448.56 ; Traffic, 80,662.08 ; Running, 490,952.67 ; Value of stock, January 1, 1921, 245,085 ; Total, 928,148.31.

Net Revenue Account : Balance from income and expenditure account, 45,277.98 ; Interest on capital, 19,589.61 ; Depreciation, 67,228.02 ; Net loss, 132,095.61.

CENTRAL PREANGER MOTOR SERVICE

Manager's Residence, Tjimahi :

No. of kilometres run by goods motors Fl.112,239

No. of kilometres run by passenger motors 50,286

Receipts, 1920, 74,226 ; 1921, 118,357.

Expenditures : General charges, 5,945 ; Traffic, 12,799 ; Running, 11,242 ; Maintenance and repairs, 16,599 ; Others, 46,324 ; Total, 92,909 ; In 1920, 77,901.

Capital Account : Balance from 1920 Fl. 127,640.66
Additions in 1921 99,530.45

227,171.11

Depreciation, 1921 17,031.56

Bal., Dec. 31, 1921 210,139.55

Provisional Balance Sheet, 1921 :

Income : Passengers, 64,910.00 ; Goods, 52,215.50 ; Others, 1,231.50 ; Value of stock, December 31, 1921, 10,832.11.

Expenditures : General charges, 28,678.60 ; Traffic, 12,798.95 ; Running, 59,207.05 ; Value of stock, January 1, 1921, 19,118 ; Balance, 9,386.51.



Photo by Kurkdjian, Sourabaya

Motor road along the North Coast of Java. Notice the way in which telegraph poles are made unnecessary

Net Revenue Account : Interest on capital, 8,870.29 ; Depreciation, 17,031.56 ; Balance from income and exp. account, 16,515.34 ; Net loss, 16,515.34.

CHERIBON MOTOR SERVICE

Manager's Residence, Koenigan :

No. of kilometres run by goods motors Fl.224.487

No. of kilometres run by passenger motors 73,341

Receipts : 1920, Fl. 102,561 ; 1921, 124,115.

Expenditures : General charges, 7,797 ; Traffic, 15,566 ; Running, 17,676 ; Maintenance and repairs, 30,505 ; Others, 70,027 ; Renewals, 508 ; Total, 142,079 ; Loss, 17,964.

This loss is attributed to the competition with several private services operating on the Cheribon-Koenigan run.

Capital Account :

Balance from 1920 Fl. 159,422.94
Additions in 1921 5,644.07

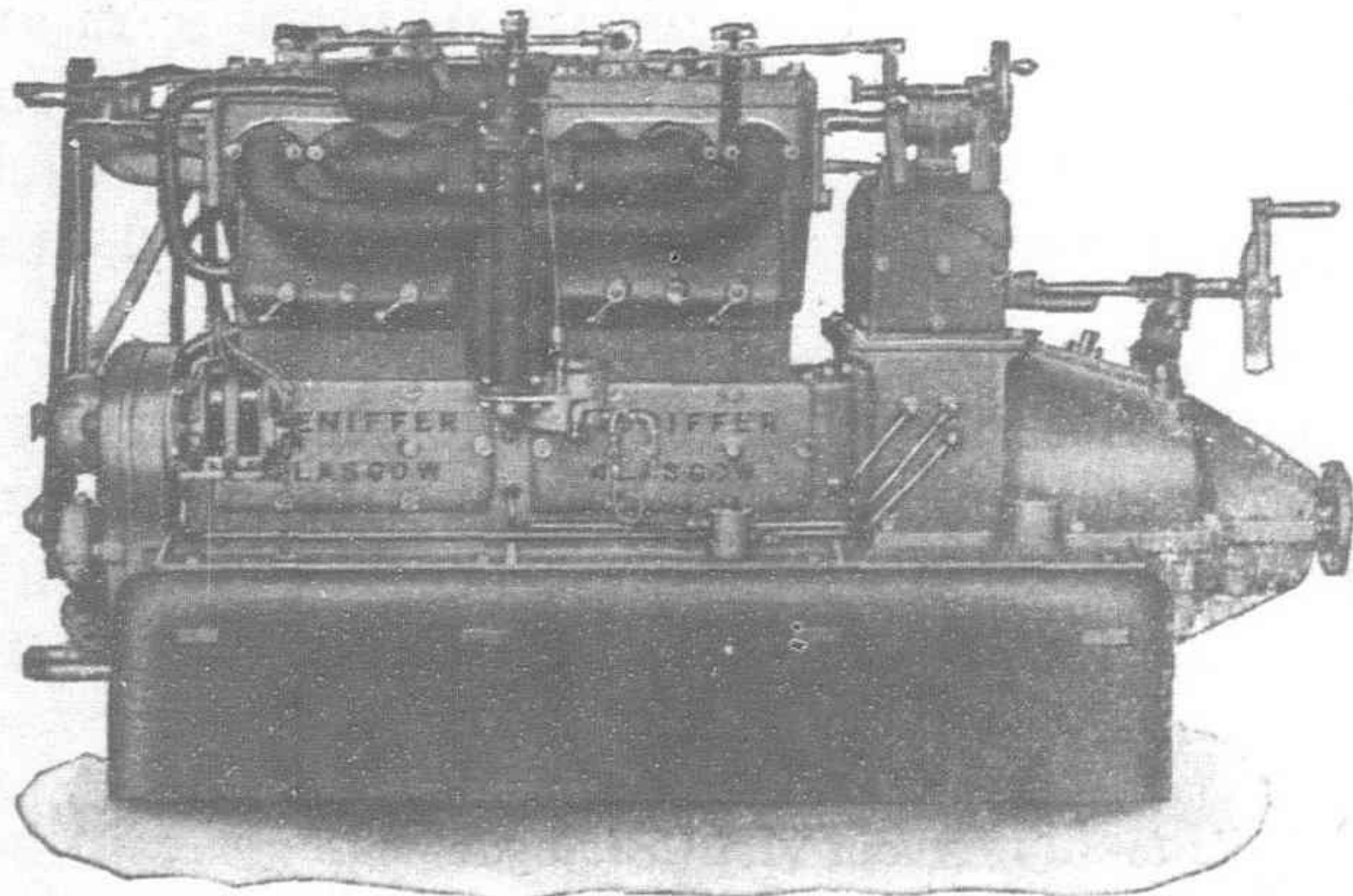
165,067.01

Depreciation, 1921 34,822.62

Balance, Dec. 31, 1921 130,244.39

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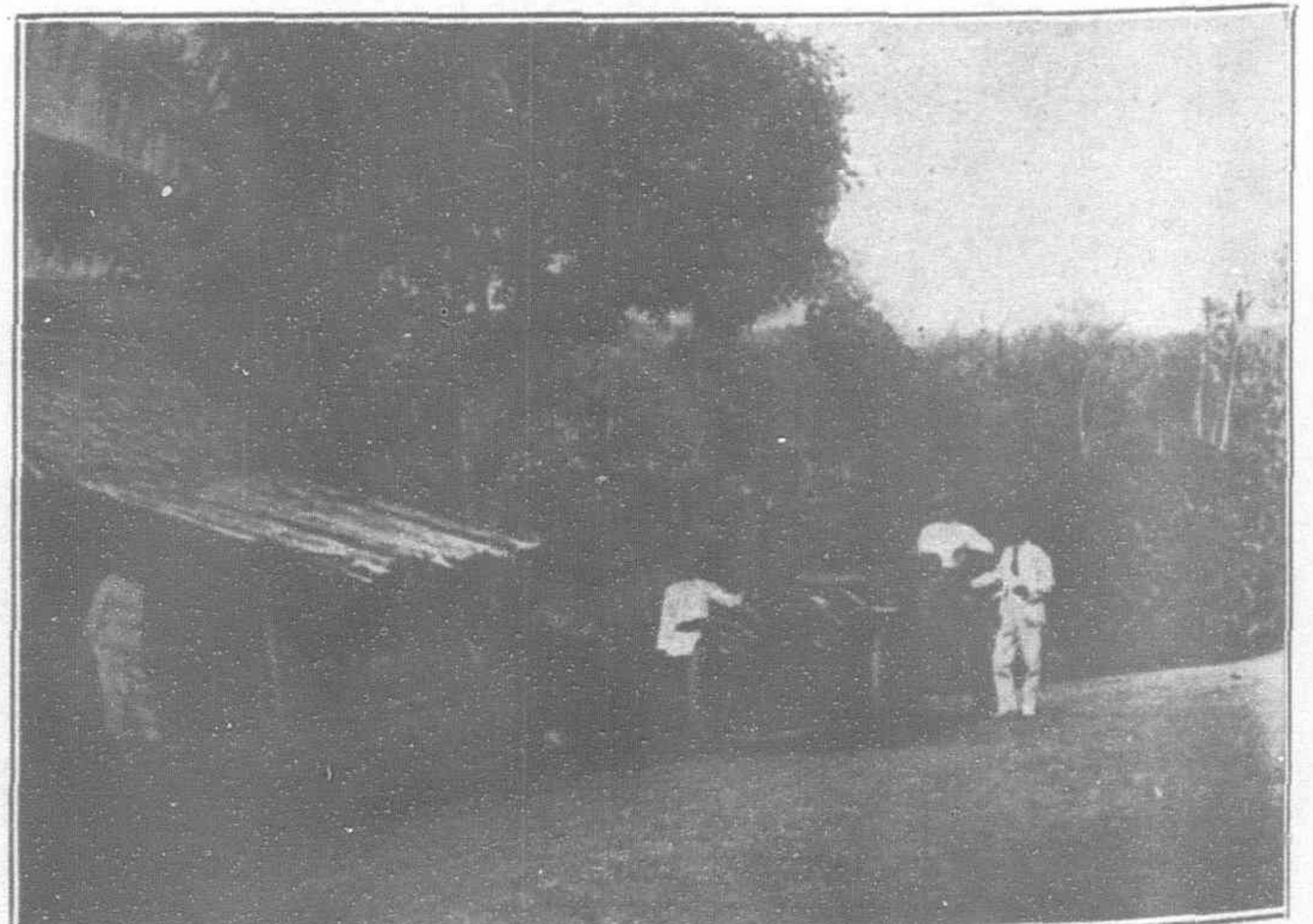
Ritchie and Bisset—at Singapore.

British and Dutch Engineering Co., Ltd.—at Batavia and Soerabaia.

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A Road in Menado, Celebes

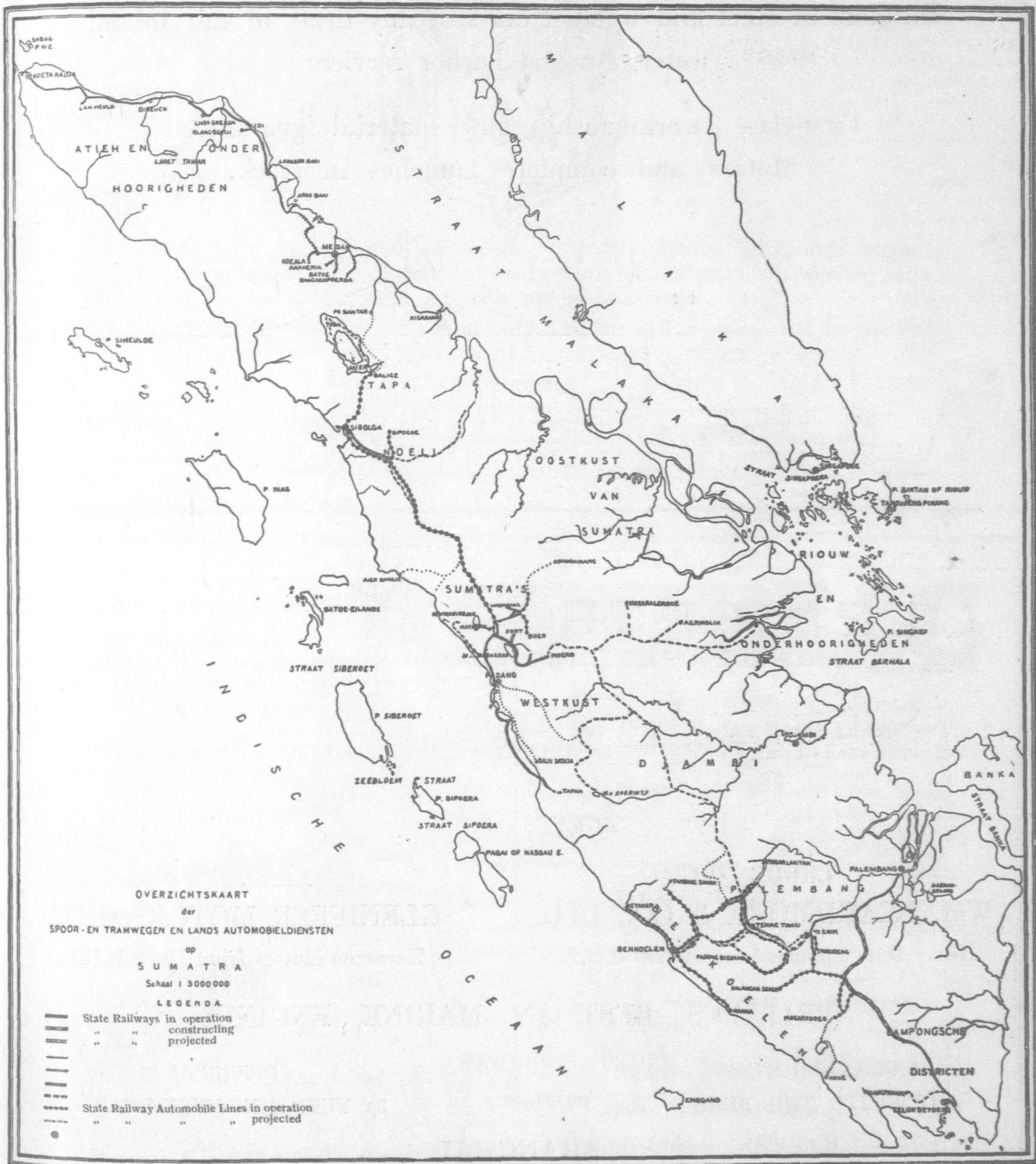
Provisional Balance Sheet, 1921 :

Income : Passengers, 114,093.15 ; Goods, 9,015.50 ; Others, 1,006.25 ; Value of stock, December 31, 1921, 33,611.96 ; Balance, 45,013.55 ; Total, 202,740.41.

Expenditures : General charges, 33,062.80 ; Traffic, 15,566.08 ;

Running, 104,576.53 ; Value of stock, January 1, 1921, 49,535 ; Total, 202,740.41.

Net Revenue Account : Balance from income and exp. account, 45,013.55 ; Interest on capital, 8,112.25 ; Depreciation, 34,822.62 ; Net loss, 87,948.42.

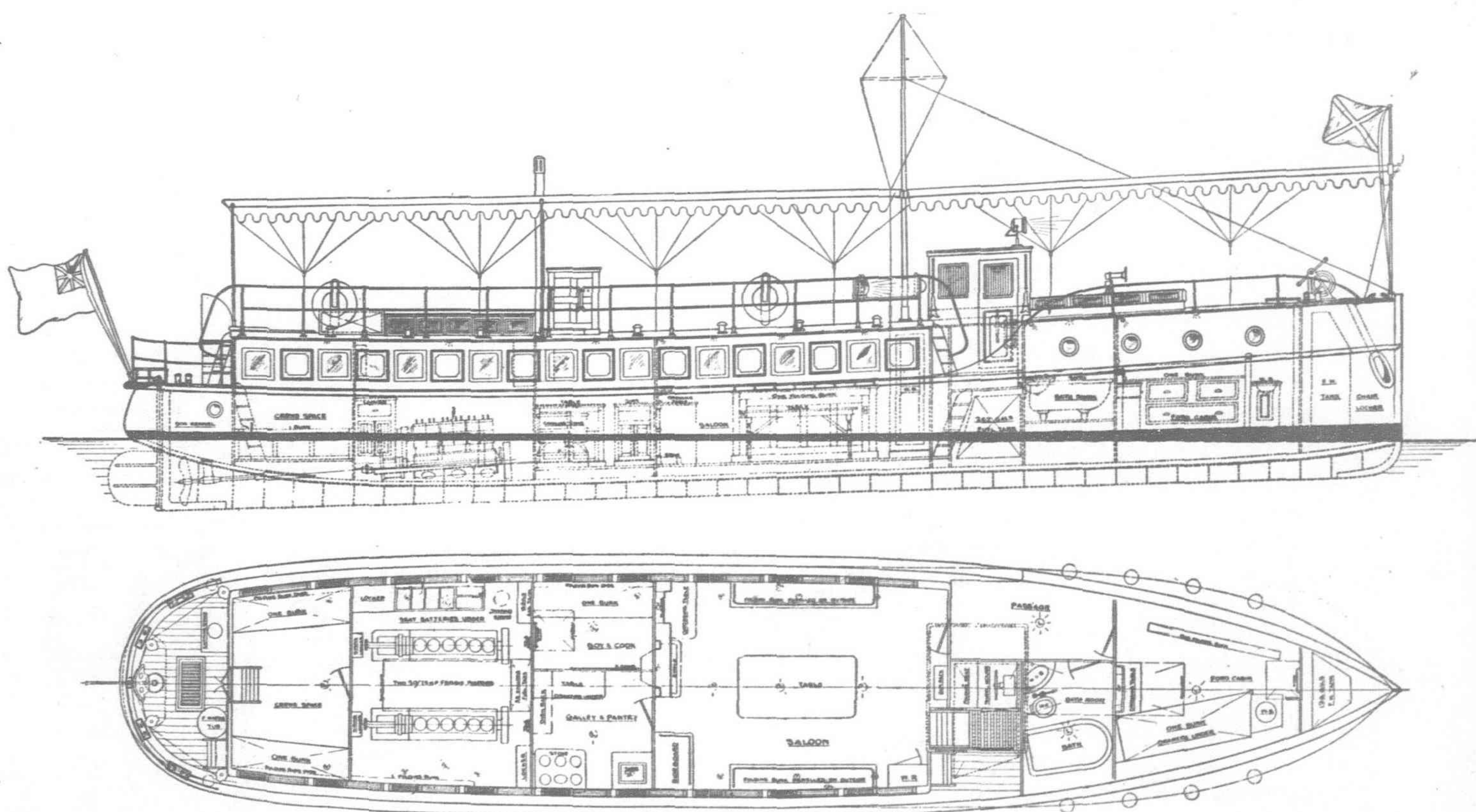


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Are manufactured for a simple purpose . . . to lubricate automobile engines. The rich lubricating qualities of our oils afford perfect lubrication to the wearing parts. Not only is this true in summer, it is equally true in Midwinter.

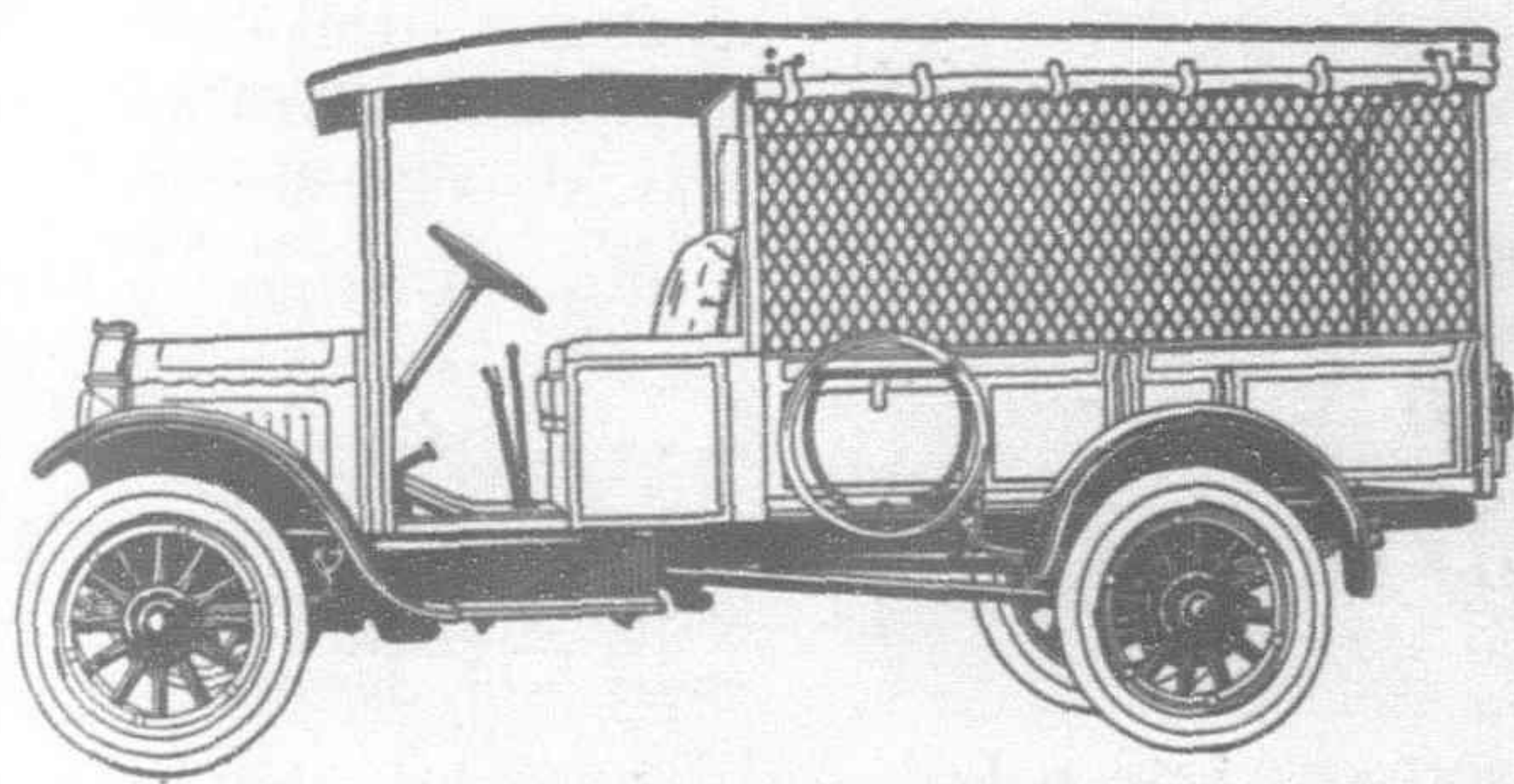
We have four grades of Auto Oils to meet every condition and requirement of the motorist.

Auto X	Light
„ XX	Medium
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The Republic Light Delivery Van supplies the long felt want for a reliable, speedy means of delivering merchandise over a wide district.

This finely constructed vehicle is fitted with pneumatic tyres; its sturdily built chassis assures long life and freedom from breakdown. Specially built for delivery service, both in first cost and operating expense, it is the most economical vehicle of its type.

Republic Trucks are also built for heavy loads and for every industry—whatever your need in commercial vehicles may be, there is a Republic Truck to meet that purpose.

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AIRPLANE LUBRICATION FOR AUTOS

MUCH interest has been evidenced in motor car circles and among car owners in the new airplane system of motor lubrication. It has proved amazingly efficient, the average mileage yield per quart of oil being well above 500 miles. It also has borne out the claims of its sponsors that it greatly reduces wear and tear on moving parts, thereby adding materially to the life of the motor.

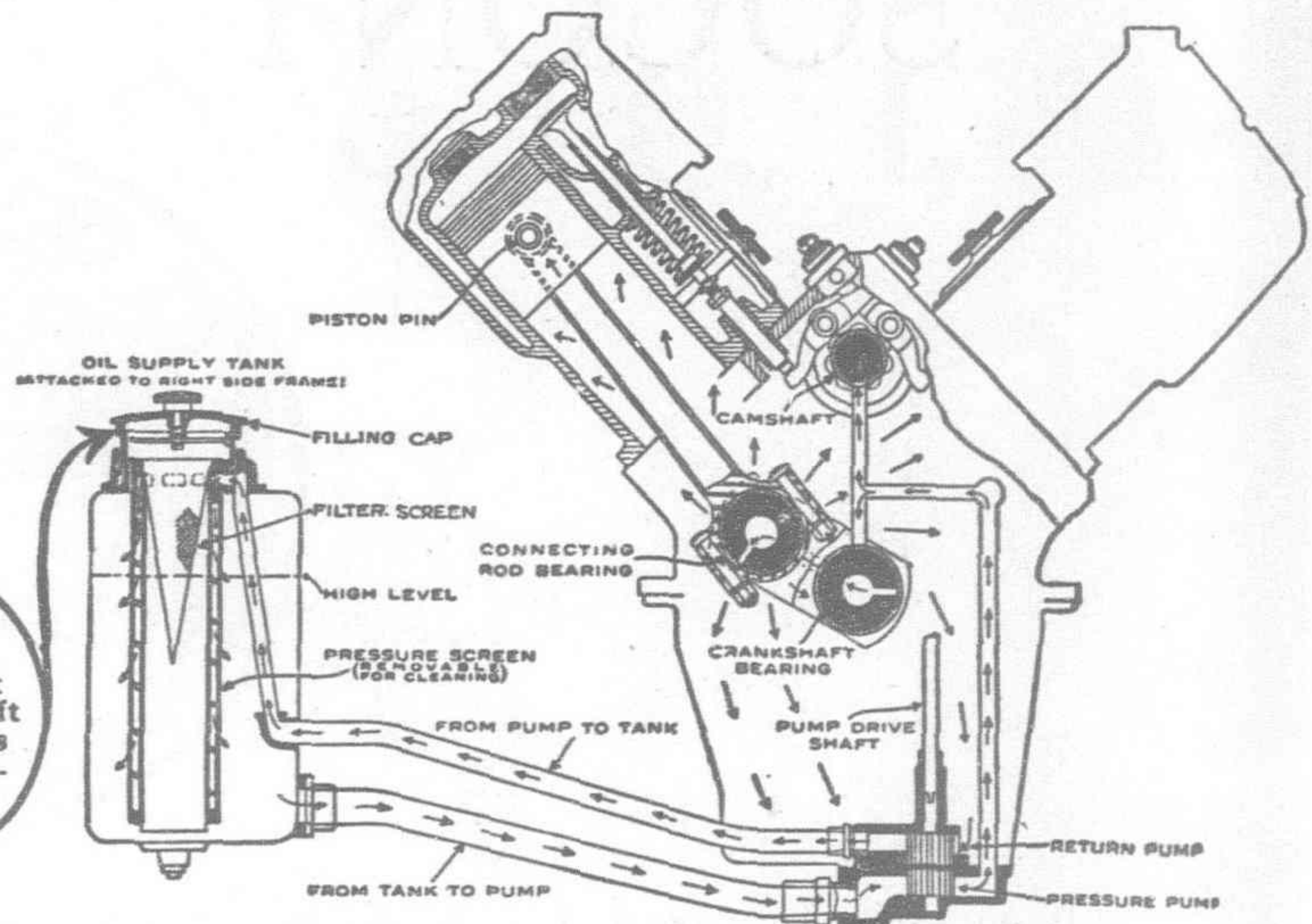
Engineers of The Standard Motor Car Company, Pittsburgh, are the first to apply the airplane system to the automobile. On the Standard Eight the oil is carried apart from the crank-case in a three-gallon container anchored to the frame under the right front fender. Oil flows by gravity through a flexible tube to the crankcase, whence it is pumped upward to cylinders, bearings, rods and all other moving parts.

It then drops to the base of the engine and is pumped back into the container, being cooled and re-filtered before again making its circuit through the motor. On a recent test run from Pittsburgh to New York, less than a quart of oil was consumed. Temperature readings after climbing and descending the redoubtable Tuscarora Ridge of the Alleghany mountains showed no appreciable increase in oil heat.

This system is based on that developed during the war by allied engineers who produced it to increase the efficiency of battle planes. In the early stages of the war countless plane bearings burned out,



Oil tank apart from crank case, filled without lifting hood. Left view shows position of filler cap and gauge.



for in a quick descent rear bearings were starved, while forward ones were flooded. On a steep climb front bearings were almost unlubricated while rear ones were inundated. Spark plugs fouled. Carbon deposits were heavy.

By carrying the oil in a separate container and forcing it to all moving parts, regardless of the pitch of flying, these evils were overcome. In the automobile it is almost as important an improvement as in the airplane. In steep climbs or quick descents oil is pumped uniformly to all parts. There can be no starved bearings nor flooded ones, nor fouled spark plugs.

It is believed that airplane lubrication of the motor car is among the most notable of automobile achievements in recent years. It has proved equally efficient in summer and zero temperature.

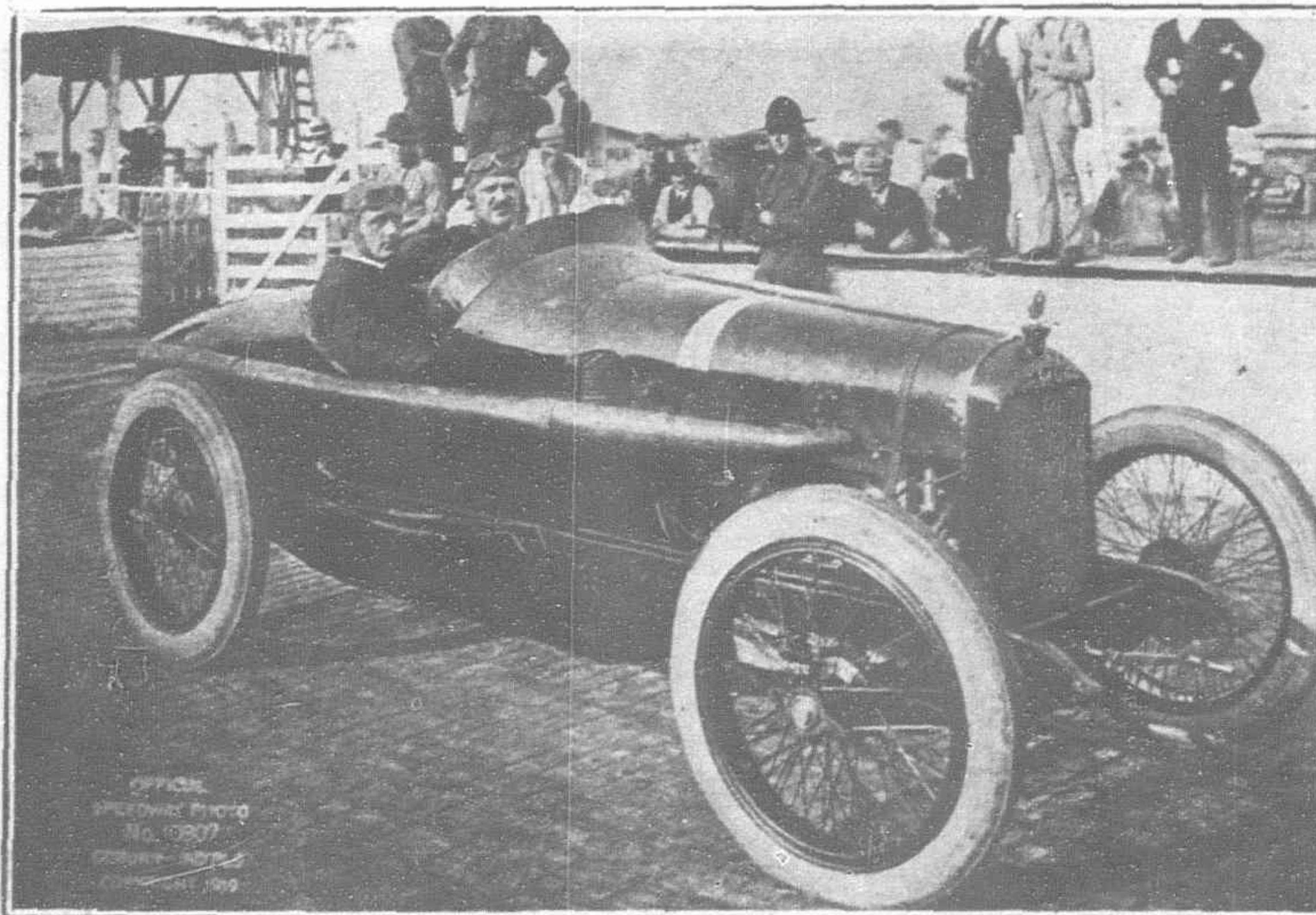
Graphite Transmission and Differential Grease No. 677

We are proud to state that No. 677 has justified the labor and expense devoted to a really intelligent effort to produce an ideal gear lubricant. It has successfully stood the test of years. There is nothing like it on the market. It is the grease the "Speed Kings" use.

No. 677 is graphited grease of medium density that flows over the gears like an oil, yet possesses the peculiar property of not settling when the gears are not in motion. It reaches all the bearings and provides a graphite coating that prevents wear, reduces friction and causes cool running at all times. No. 677 remains unchanged in hot or cold weather. It will last far longer than the best plain grease.

No. 677 is recommended for transmissions and differentials, except those designed for light oil lubrication. The consistency is about that of heavy gear oil. It is also the most satisfactory lubricant for electric gear shift mechanisms, the reverse gears of power boats, and for change-speed gear boxes of motorcycles.

Sold in one, five and ten pound tins. Larger packages if desired.



"Many times Dixon's Graphite Automobile Lubricants have pulled my car through a trying race without lubricating difficulty."—LOUIS CHEVROLET.

Joseph Dixon Crucible Co.

Established, 1827

For Prices, Information, etc., communicate with

HENRY KATTEN

22 KIUKIANG ROAD
SHANGHAI, CHINA

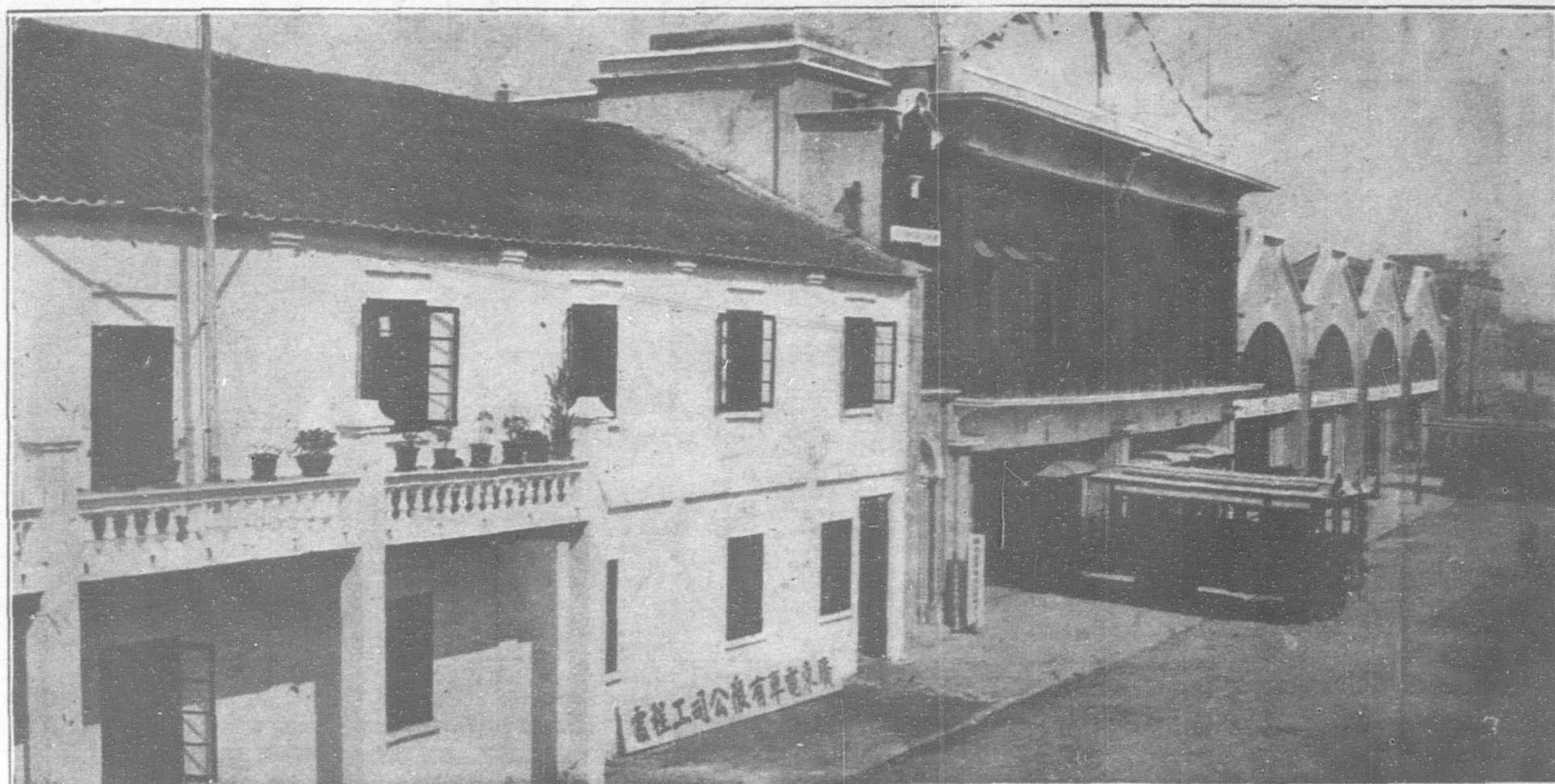
Graphite Cup Greases

Cup Greases containing fine flake graphite reduce friction to a minimum. By using these high-grade graphited greases, bearings soon acquire the well-known graphite polish that eliminates friction and causes easy running. Used in all grease cups, wheel spindles, etc.

Dixon's Graphite Cup Grease No. 3 is recommended, except in warm climates, where No. 5 is more suitable. The consistency of each grade changes but little under wide temperature variation.

The importance of attending to the numerous small bearings and moving parts of cars is frequently overlooked. Wherever you see a grease cup don't think it is put on as an ornament, but give it a turn once a day or once a week according to the requirements. Don't forget to keep the cups filled with grease.

Sold in one, five and ten pound tins. Larger packages if desired.



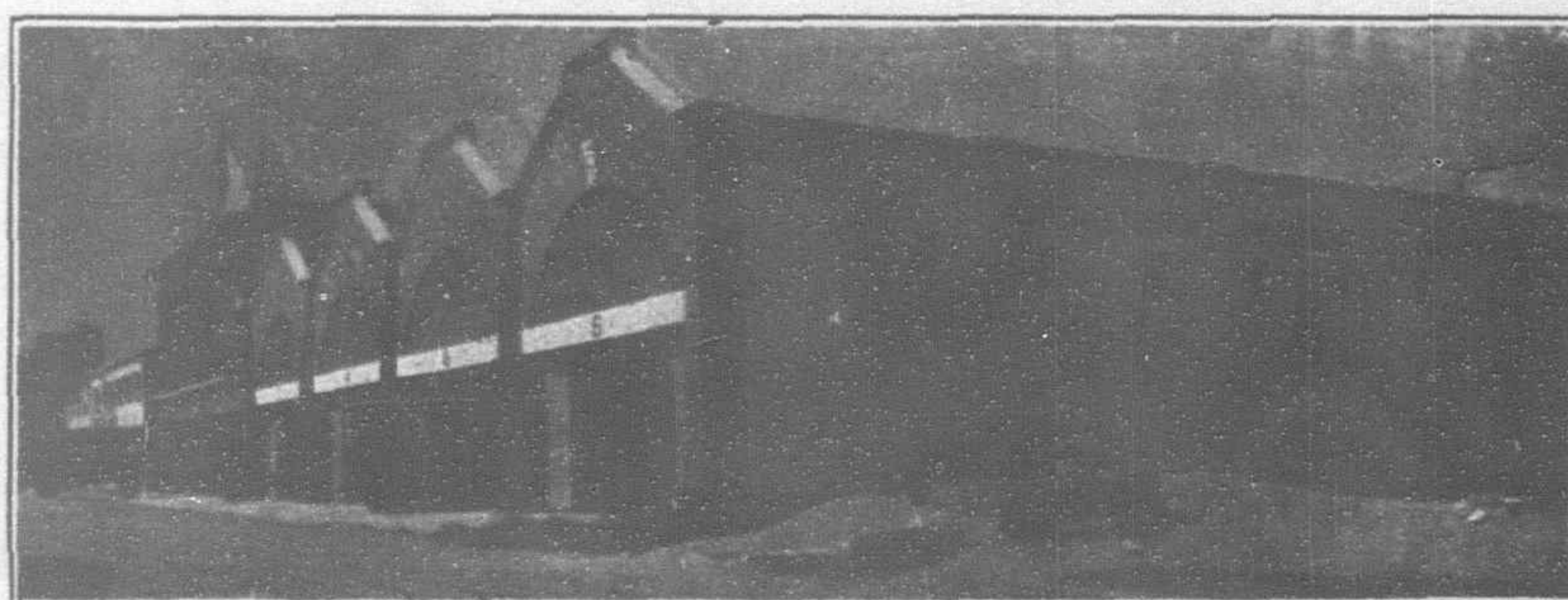
Offices, Car Barns and Engineering Department of the Kwangtung Tramway Co., Ltd. at Canton

The Kwangtung Tramway Co., Ltd.

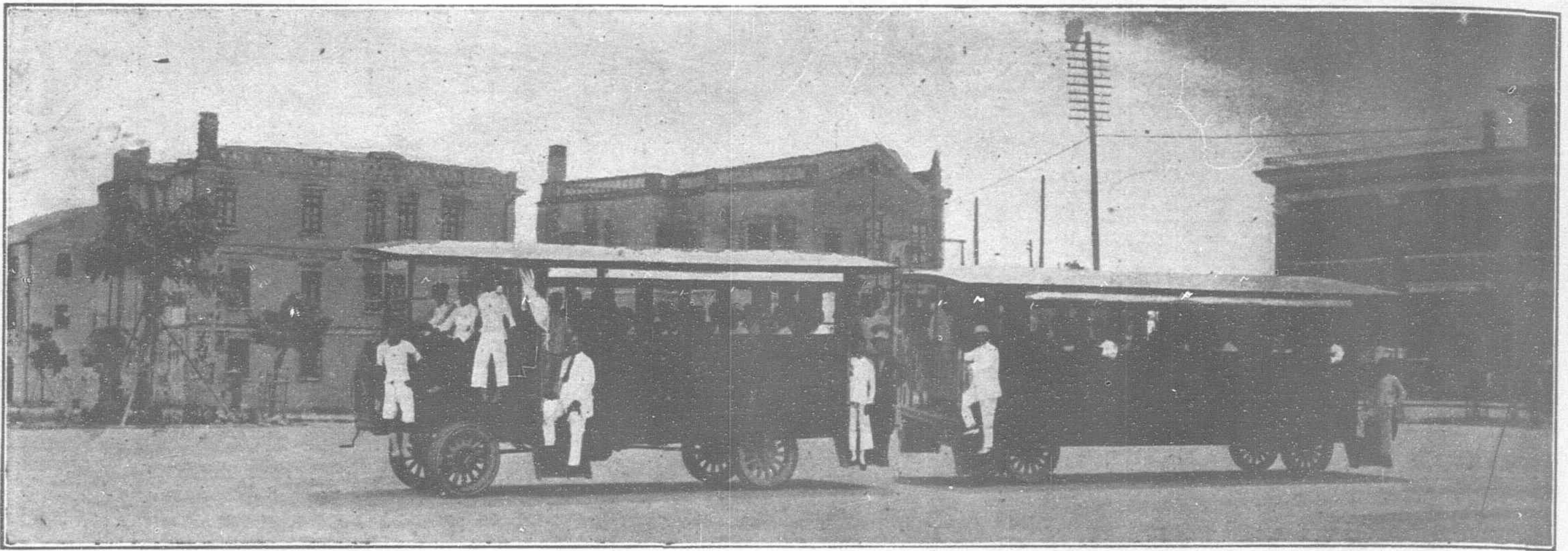
EARLY in 1917, a Canadian promoter, T. R. E. MacInnes, appeared in Canton, and, obtaining an interview with the Governor, Chu Ching-lan, proposed to take down the ancient walls of the city, and cut a number of boulevards through the narrow streets, for the purpose of operating a tramway service. He was well entertained by the governor, who regarded the proposition very favorably. Mr. MacInnes was fortunate in associating with himself Mr. Peter Hing (Wu Tsic-pun) a clever and resourceful Chinese lawyer, trained in Canada, and the first Chinese graduate of McGill University. Political disturbances in Canton in 1917 prevented the scheme being carried out at the time. But two years later MacInnes returned to Canton, and continued his interrupted negotiations. In August, 1919, a concession was granted to him and his two associates, Messrs. Peter Hing and Sam Kee (Chan Choi) a well-known Chinese merchant of Vancouver, and naturalized Canadian citizen. By the concession an exclusive franchise was granted for a term of twenty years to operate any form of tramway service in Canton and suburbs anywhere within a radius of ten miles from the centre of the city. Forthwith a company was incorporated under name of the Kwangtung Tramway Company, and the concession was assigned to the company. Like the Wing On Company, the Sincere Company, the Sun Company, and other well-known Chinese mercantile organizations, the tramway company was incorporated under the laws of Hongkong as a Hongkong-China company, thereby having its affairs administered under wise regulations, and the interests of its shareholders properly protected. The company paid one million dollars Hongkong currency to the Canton government for the concession, and for that the company is free from taxation in any form, direct or indirect, during the term of the concession, or any renewal of it. The million dollars so paid was entirely expended in taking down the walls of the city, and constructing boulevards, or maloos, as they are locally known,

developing a plan originally prepared by a Canadian engineer, P. W. W. Bell, who came to Canton at the suggestion of MacInnes in 1917. The company, in spite of many unusual difficulties, and civil strife in Canton, has forged ahead to success under the strong and experienced direction of Mr. Eng Hok-fong, a Chinese business man of Hongkong, who became president and managing director of the company. Mr. Eng Hok-fong is president also of the Mexico Steamship Company and the Eng Hok Fong Steamship Company, and has been a man of affairs in Mexico and California as well as China. With him, as directors of the tramway company, are associated Messrs. Ng Ye-hon, Yu Tao-sang, Chin Kwang-hing, Kwong Cheung-pao and Chung Tin-yow, all wealthy business men of Hongkong, and Messrs. Ma Chao-kum, Lau Siu-wan and Ng Cheu-kwan of Canton, and T. R. E. MacInnes of Vancouver. Mr. MacInnes is the only foreign member of the company, and he is temporarily residing in Canton to give what assistance he can to the company during present disturbed conditions. Mr. Peter Hing is the energetic local manager, and is ably assisted by Messrs. Fong Ukiah as sub-manager and Ng Lai-ting, traffic manager. The company in 1920 decided to operate motorbusses, after the fashion of London, and for that purpose purchased a number of F. W. D. trucks in the United States, building the bodies in Canton. At present, on the maloos which have been completed, the company operates twenty cars with fifteen trailers. The cars seat twenty-three first-class passengers, and the trailers forty-three second class. The company laid down several miles of specially concreted strips along the maloos on which to run its cars. It has been found, how-

ever, that the foundation is not sufficient, and the roads are in continual need of repair. So the company has now decided to lay down ten miles of double track grooved rails and run its motor cars thereon as is now economically done in the United States for short routes, and on over four hundred miles of the P. G. E. Government Railway of British Columbia. The first rails laid



Another View of Car Barns of the Kwangtung Tramway Co.



One of the F.D.W. Trucks and Trailers in use by the Kwangtung Tramway Company, starting out from the Tashatao Railway Station Terminus in Canton on the 150-foot wide Pak Wan Maloo (White Cloud Highway). These are three-ton trucks with power and brakes applied to all four wheels. This is claimed to add greatly to safety in handling, a most important feature when inaugurating a new service in a Chinese city where the prevailing sentiment is apt to be against any innovation in the old modes of transportation.

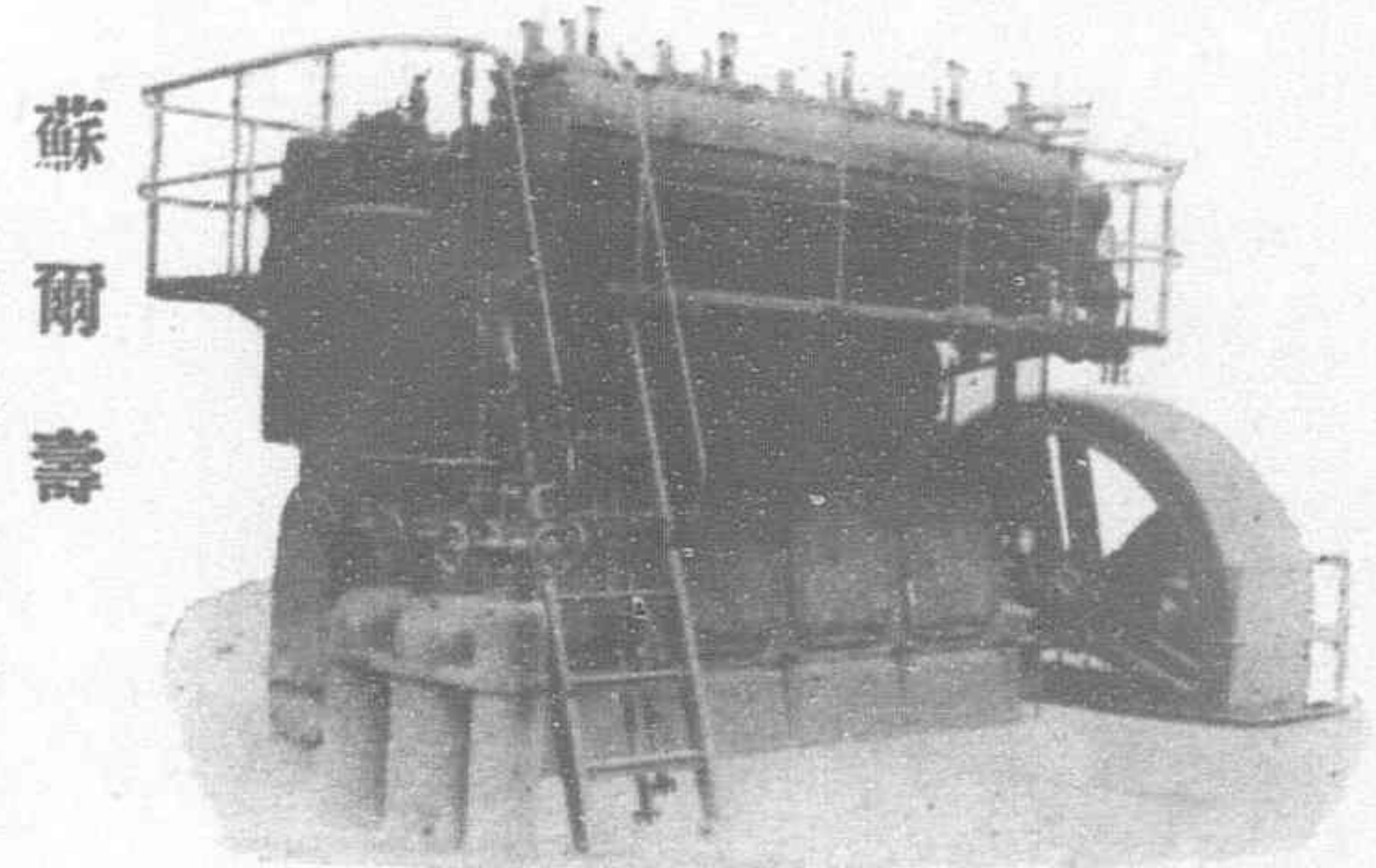
The F.W.D. trucks are designed so they can be converted into rail-cars by simply replacing the rubber tires with steel ones and locking the steering gear. As soon as the present trouble is over, the company intends to lay down steel tracks and when this is done it will only take a couple of hours work on each car and trailer to convert them for the rails. The work is under the direction of an experienced American engineer, Mr. Harvey L. Decker, who has had considerable experience in working these cars in India.

down will be from the Canton-Kowloon Railway Station (Tashatao) to the Canton-Hankow station (Yueh Han) a distance of four miles through the busiest section of the city. For this purpose the houses along Shakee, opposite the foreign island settlement of Shameen, were being demolished with the object of widening the fifteen-foot thoroughfare to a maloo of eighty feet when the conflict between Sun Yat-sen and Chen Chuing-ming put a temporary stop to the work. This disturbance, however, is looked upon by the company as no more than a passing storm, and it is confidently expected that the normal life of the city will be resumed before the summer is over. During the bombardment of Canton on the 17th of June last the company's buildings were struck by five shot, but fortunately they were solid shot and not shell, so not much damage was done, and none of the company's employees were hit, although at a teahouse within a hundred yards sixteen people were killed and many injured, and several were killed on adjacent streets. One shot coming through the wall crossed directly over the desk where Mr. MacInnes usually sits, but he had his head elsewhere at the time, else it would not be where it now is. Except when stopped by definite military orders the company continues to run its cars during the present trouble, even when the shops are all locked and barred. To see them going gives a certain amount of confidence to the citizens, and it helps to allay panic. The period of twenty years for which the concession was granted does not begin to run against the company until a certain minimum route of maloo has been completed by the city, and therefore the present time is so much added during which the company organizes its business and trains a loyal body of employees. The company has been fortunate in securing the services of Mr. Harvey Decker, an American motor expert, who has had wide experience in handling motor-trucks in tropical countries, including India and Java. Rails will be laid down of proper weight and fashion so that if in the future it be thought more profitable to build a power-plant and run electric cars no change need be made except to add overhead equipment. From the company's experience so far, however, it is thought the gasoline car on rails will be the most profitable form of tramway service. The mere fact that each car runs on its own power, and so cannot be stopped by an accident or strike at a central power station is in itself a guarantee of continuous service for the public which cannot be had otherwise, as proved by the tramway strike in Hongkong some years ago. The company considers its future bright. And it has the satisfaction of knowing that it is indeed the mother of the maloo, and that to its inception and operation is due the great impetus for municipal improvement which has been so marked during the past two years

in Canton. Regarded at first with some suspicion and conservative hostility, especially by those landowners whose lands were curtailed to make way for the maloo, yet now it is cordially appreciated and supported by all classes in Canton. Land has increased ten times in value where the maloo run, the ricscha coolies now have over fifteen miles additional roads on which they can operate, and hitherto unthought of extensions of business and opportunities for employment have come as a result of the promotion of the tramway idea.

SULZER BROTHERS

SHANGHAI ENGINEERING OFFICE
No. 4 AVE. EDWARD VII



200 H.P. Diesel Engine

Uniflow Steam Engines, Upright Watertube Boilers, High and Lowlift Centrifugal Pumps, Fans and Ventilators for all purposes, Fire Engines, STATIONARY DIESEL ENGINES, Direct Reversible Diesel Marine Engines, Ice and Refrigerating Plants, Central Heating, Electro-Boilers, Maag Gear Machines.

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WINTERTHUR. SWITZERLAND.

Motor Transportation in the Philippines

ALTHOUGH the registration of automobiles in the Philippines increased from 8,341 to 9,738 and motor trucks, from 2,722 to 3,053, the general tendency was downward in both the passenger and tonnage movement for 1921. The Manila Electric Company reports a decrease in the passenger movement of 1,954,445 during the year. The Manila Railroad Company, however, reports an increase in tonnage movement of from 806,380 in 1920 to 1,051,551 in 1921, though the passenger movement decreased 2,326,804 for 1921. This reduction, however, is mostly due to the competition of automobiles and motor trucks operating between the city of Manila and near-by provinces.

During the year 1921, there was comparatively little road building done on the islands. Only 134 kilometres were added to the system. First-class roads were increased by 159.9 kilometres bringing the total up to 5,066.2; 7.3 kilometres were added to the second-class roads a total of 2,044.8 kilometres, while third-class roads show a decrease of 43.2 kilometres, a total of 3,036.6. The total lengths of roads in the islands is now 10,147.6 kilometres. During the year Pesos 4,546,284 was expended on maintenance and Pesos 8,180,413 on new bridges and roads, a total of Pesos 12,726,697.

The first-class roads are open the entire year for automobile traffic. These roads have permanent bridges and culverts or regular ferry service and are all hard surfaced. The second-class roads are suitable for all kinds of traffic only during the dry season. These are standard width roads but have many temporary bridges and culverts, mostly built of bamboo, many of which are washed out during the rainy season. These roads are partly ordinary dirt roads. Third-class roads are really cart tracks, although a light automobile can use them during the dry season.

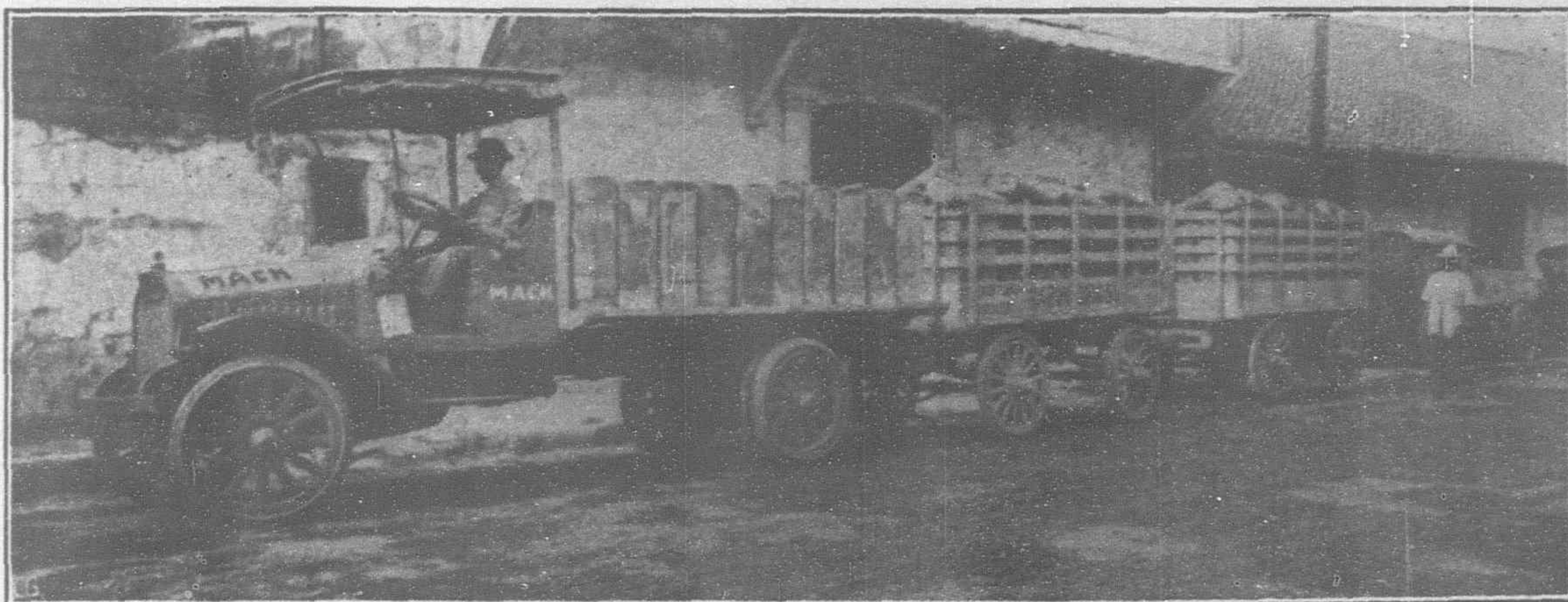
There are 1,428 kilometres of roads surfaced with crushed stone: 3,210 kilometres surfaced with gravel: 1,460 kilometres surfaced with coral and 3,818 kilometres unsurfaced dirt roads. The crushed stone used is of several kinds, mostly sandstone and limestone. There are some very good coral roads, but the surface does not last long. An experimental concrete road was put down seven years ago, but it has become badly crushed and the engineers realize that this was caused by not having a proper base. It has been estimated that with a daily traffic of 500 vehicles on a macadam road that the annual upkeep is Pesos 1,000 per kilometre.

There are 7,461 bridges in the islands with a span of about 20 miles, of which about 4,400 are concrete and culverts with about 10 miles span.

Of the 9,738 automobiles registered in the islands, 4,782 are in the city of Manila or about half of the total registered. This, however, does not include motor trucks, of which there are 3,053 registered, 1,280 being in Manila. There are 20 makes of motor cycles with a total registration of 1,093 scattered throughout the islands. The registration list of cars by makers for 1922, compiled by E. M. Mac Intosh of the Goodyear Tire and Rubber Co., shows the following distribution:—

AUTOMOBILES REGISTERED IN P. I. UP
TO APRIL 1, 1922.

Make.	Private.	Hire.	Garage.	Gov't	Pub. Ut.	Total.	% of Total.
Dodge ...	1,281	353	87	80	34	1,835	23
Ford ...	1,058	433	19	137	35	1,682	21
Buick ...	737	167	21	3	10	938	12
Hupmobile...	445	60	1	26	17	549	7
Overland ...	361	68	14	3	10	456	5.5
Hudson ...	367	9	18	3	4	401	5
Chevrolet ...	135	152	10	1	5	303	4
Maxwell ...	233	27	26	—	2	288	3.5
Essex ...	188	3	1	—	1	193	2.5



Cargo Transportation in Manila. A Mack Truck pulling two 2-ton trailers loaded to capacity. There are 1,280 trucks in Manila

Willys-Knight ...	137	7	26	1	1	172	2
Studebaker...	126	9	1	—	2	138	1.7
Cadillac ...	85	3	—	6	—	94	1
Nash ...	84	5	5	—	—	94	1
Chandler ...	60	2	2	21	—	85	1
Oakland ...	56	9	1	1	—	67	1
Scripps-Booth ...	65	2	2	—	—	67	1
Oldsmobile...	59	—	1	—	—	60	0.7
Renault ...	57	—	—	—	—	57	0.7
Saxon ...	39	3	—	—	—	42	0.5
Paige ...	34	2	—	—	—	37	0.5
Case...	25	—	—	—	—	25	0.3
Peerless ...	24	1	—	—	—	25	0.3
Briscoe ...	21	—	—	—	1	22	0.3
Brazier ...	21	—	—	—	—	21	0.3
Cleveland ...	21	—	—	—	—	21	0.3
Franklin ...	18	—	—	—	—	18	0.2
Packard ...	14	—	—	2	—	16	0.2
White ...	4	—	—	10	—	14	0.2
Chalmers ...	12	1	—	—	1	14	0.2
Cole ...	12	—	—	—	—	12	0.15
Dort ...	8	2	1	—	—	11	0.15
Panhard ...	11	—	—	—	—	11	0.15
Reo ...	10	1	—	—	—	11	0.15
Stutz ...	10	—	—	—	—	10	0.15
Stearns Knight ...	10	—	—	—	—	10	0.15
King ...	8	1	—	—	—	9	0.1
Delahaye ...	9	—	—	—	—	9	0.1
Haynes ...	5	2	—	—	—	7	0.1
Willys Overland ...	6	—	—	1	—	7	0.1
Winton ...	7	—	—	—	—	7	0.1
Trumbull ...	6	—	—	—	—	6	—
Seneca ...	6	—	—	—	—	6	—
Pierce Arrow ...	5	—	—	1	—	6	—
Elgin ...	5	1	—	—	—	6	—
Austin ...	5	—	—	—	—	5	—
Commonwealth ...	5	—	—	—	—	5	—
Mercer ...	5	—	—	—	—	5	—
Premier ...	5	—	—	—	—	5	—
68 other makes ...	130	5	—	3	4	142	1.5
Totals ...	6,035	1,328	234	299	128	8,004	99.8

98.3 per cent. of all the cars in the P. I. are American makes and only 1.7 per cent. are European.

This list includes 128 passenger car chassis which have been equipped with buss bodies. These chassis have been registered as trucks and are therefore listed among the trucks on the accompanying list. Those include 35 Fords, 34 Dodges, 17 Hupmobiles, 10 Buicks, 10 Overlands, 5 Chevrolets, 4 Hudsons and 13 others.

TRUCKS IN PHILIPPINE ISLANDS BY MAKES UP

TO APRIL 1, 1922.

Make.	Private	Hire.	Garage.	Gov't.	Pub. Ut.	Total.	% of Total.
Ford ...	300	113	62	141	247	863	35
White ...	47	52	8	71	136	314	13
G. M. C. ...	36	14	25	47	45	167	7
Denby ...	47	12	9	1	32	121	5
Dodge ...	29	2	3	7	64	105	4
Packard ...	19	8	6	20	18	71	3
Clydesdale ...	23	6	10	—	17	56	2
Truck Trailers ...	23	3	7	3	7	53	2
Traffic ...	13	16	—	—	17	46	2
Maxwell ...	20	13	5	—	7	45	2
Bethlehem ...	9	29	1	—	6	45	2
Overland ...	17	3	3	—	19	42	2
Federal ...	11	9	2	9	10	41	2
Hupmobile... ..	9	—	2	1	23	35	1.5
Buick ...	9	4	—	—	18	31	1
G. V. C. ...	—	—	—	30	—	30	1
Troy ...	23	—	1	1	4	29	1
Garford ...	12	8	3	—	6	29	1
Delahaye ...	14	1	10	—	1	26	1
F. W. D. ...	—	2	—	19	—	21	1
Hudson ...	6	3	2	—	5	16	0.5
Autocar ...	11	—	4	—	—	15	0.5
All American ...	4	2	—	—	6	12	0.5
Gramm ...	4	6	1	2	—	13	0.5
Studebaker... ..	4	2	—	—	5	11	0.5
Mack ...	3	5	—	—	2	10	0.5
Chevrolet ...	3	—	—	—	7	10	0.5
Alco... ..	—	1	—	8	—	9	0.5
Gen. Vehicle ...	9	—	—	—	—	9	0.5
Oldsmobile... ..	2	—	2	—	5	9	0.5
Chalmers ...	2	1	—	—	4	7	0.5
De Dion Bouton ...	—	—	—	3	3	6	0.5
Reo ...	3	1	—	1	1	6	0.5
U. S. ...	3	—	1	—	1	5	—
Renault ...	3	2	—	—	—	5	—
Peerless ...	—	—	1	1	3	5	—
Mitchell ...	2	2	—	—	1	5	—
Doane ...	3	2	—	—	—	5	—
Dearborn ...	3	—	—	—	2	5	—
Christie ...	—	—	—	5	—	5	—
Berliet ...	1	—	3	1	—	5	—
American La Franco ...	—	—	—	5	—	5	—
Day Elder ...	2	2	—	—	—	4	—
Indiana ...	—	4	—	—	—	4	—
Liberty ...	—	—	—	4	—	4	—
Sanford ...	2	2	—	—	—	4	—
Service ...	2	1	1	—	—	4	—
St. B. ...	—	—	—	4	—	4	—
Jeffery ...	2	—	—	—	1	3	—
International ...	—	—	—	—	3	3	—
Commercial ...	—	—	—	3	—	3	—
Brasier ...	2	1	—	—	—	3	—
Winther ...	1	—	—	2	—	3	—
Warner ...	—	3	—	—	—	3	—
Opel... ..	3	—	—	—	—	3	—
Garner ...	2	—	—	1	—	3	—
40 Other makes ...	—	—	—	—	—	59	—
Totals ...	774	357	178	407	739	2,455	—

The following table shows the number of motor cycles registered in the Philippine Islands up to April 1st, 1922 :—

Make.	Private-Owned.	Government.	Total.	%
Harley Davidson ...	176	188	364	45
Indian... ..	209	31	240	29
Cleveland ...	45	2	47	5.5
Excelsior ...	44	—	44	5.5
Smith Bicycle Wheel .	32	8	40	5
Dayton ...	23	2	25	3
Henderson ...	22	—	22	3
F. N. ...	8	—	8	1
Briggs ...	4	—	4	0.5
Pope ...	4	—	4	0.5
All Others ...	11	—	11	2
Total ...	578	231	809	100

42 per cent. of all motor cycles are in Manila and the remainder scattered over the provinces.

51 per cent. of all applicants for license applied for 1 passenger.

38 per cent. of all applicants for license applied for 2 passenger.

11 per cent. of all applicants for license applied for 3 passenger.

There is no record of the number with side cars but the best available authority shows about 40 per cent. of all motor cycles have side cars.

PHILIPPINE ISLAND CAR REGISTRATION

FOR APRIL, MAY AND JUNE, 1922.

Registration for 2nd quarter in 1922, April, May and June show the following new cars registered :—

Make of Car.	Registered by: Private Owners	Hire Cars	Gov.	Total New Registration	% of Total
Ford ...	40	9	1	50	20
Dodge ...	40	4	2	47	19
Buick ...	17	2	—	19	7.5
Overland ...	14	2	—	16	6.5
Studebaker... ..	14	—	—	14	5.5
Chevrolet ...	11	3	—	14	5.5
Essex ...	12	—	—	12	5
Willys-Knight ...	12	—	—	12	5
Cleveland ...	9	—	—	9	3.5
Hudson ...	4	—	—	4	1.5
Chandler ...	4	—	—	4	1.5
Scrpps Booth ...	4	—	—	4	1.5
Hupmobile ...	4	—	—	4	1.5
Nash ...	4	—	—	4	1.5
Oakland ...	3	1	—	4	1.5
Cadillac ...	3	—	1	4	1.5
Packard ...	3	—	—	3	1
Maxwell ...	3	—	—	3	1
Oakland ...	3	—	—	3	1
Haynes ...	3	—	—	3	1
Cole ...	2	—	—	2	1
Stephens ...	2	—	—	2	1
Briscoe ...	2	—	—	2	1
14 others ...	14	—	—	14	3
Total ...	227	21	4	253	100

PHILIPPINE ISLANDS MOTOR CYCLE REGISTRATIONS

FOR APRIL MAY AND JUNE, 1922.

Registration for motor cycles for April, May and June, 1922, in the Philippine Islands are as follows :—

Make of M. C.	Registered by: Private Owners	Gov.	Total New Registration	% of Total
Harley D. ...	7	29	36	61
Indian ...	10	1	11	19
Cleveland ...	4	1	5	8.5
Henderson ...	2	—	2	3.5
Shaw ...	2	—	2	3.5
Opel ...	2	—	2	3.5
Excelsior ...	1	—	1	1
Total ...	28	31	59	100

PHILIPPINE ISLANDS TRUCKS REGISTRATION

FOR APRIL, MAY AND JUNE, 1922.

Registration for new trucks for April, May and June, 1922, in the Philippine Islands are as follows :—

Make of Truck.	Registered by: Private Owners	Hire Trucks	Gov. Trucks	Total New Registration	% of Total
Ford 1 ton ...	7	2	3	12	30
Garford ...	2	1	5	8	20
White ...	—	2	4	6	14
G. M. C. ...	—	2	1	3	7
Standard ...	—	—	2	2	5
Day. Elder ...	—	2	—	2	5
Denby ...	—	1	—	1	2.5
Federal ...	—	1	—	1	2.5
U. S. ...	—	1	—	1	2.5
Bethlehem ...	—	1	—	1	2.5
Packard ...	1	—	—	1	2.5
Mohawk ...	1	—	—	1	2.5
Dodge ...	1	—	—	1	2.5
Arcadia ...	1	—	—	1	2.5
Total ...	13	13	15	41	101